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AN INDEX OF PATENTED MOTHPROOFING MATERIALS

By

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The number of materials proposed for use in combating insects attacking wool, mohair, silk, furs, feathers and other animal fibers has greatly increased in recent years. This increase is largely due to the activities of inventors who have suggested a multitude of products for protecting woolen textiles against the ravages of clothes moths. The search for materials for mothproofing fabrics has been stimulated by a growing realization of the economic importance of the problem of fabric pest control. In the United States alone the loss caused by clothes moths, carpet beetles, furniture beetles and similar insects has been estimated conservatively at $100,000,000 each year.

The purpose in publishing this list is to aid those engaged in researches on insecticides by making known materials which have been proposed or tested for insect control. It is believed that in many cases a material which has been found to be an effective insecticide for use against clothes moths may find application against insect pests attacking vegetation. Fluorides and fluosilicates, for example, which are among the most effective mothproofing materials are used successfully as insecticides against chicken lice and roaches. Fluorine compounds have been tested experimentally against several kinds of insects, such as the cotton boll weevil, codling moth, sugarcane borer, Mexican bean beetle, and European corn borer, with results indicating that this group of materials is worthy of further investigation. Information concerning ineffective mothproofing agents is also of value, because it will prevent a repetition of tests already carried out.

This list of materials does not include fumigants which are gases at ordinary temperatures, such as hydrogen cyanide, ethylene oxide, and sulphur dioxide. Fumigants which are liquids at ordinary temperatures and which have been used as solvents for the application of mothproofing materials to goods, such as carbon tetrachloride and benzene, are included. The action of a fumigant ceases when the fumigated article is removed from the fumigating chamber. Mothproofing materials, on the other hand, are intended to persist for sometime and even to withstand the action of laundering. Most of the effective mothproofing materials are stomach poisons, which kill the young clothes moth larvae when ingested.

Most of the so-called clothes-moth repellents, such as naphthalene and paradichlorobenzene, are ineffective as repellents for the larvae (Bettimer, J. Econ. Ent. 22:570-573, 1929), but the vapors of those compounds will kill insects confined in a gas-tight enclosed space.

The methods of testing mothproofing materials have not been standardized, and different procedures have been employed by various investigators. Jackson and Wassell (Ind. Eng. Chem. 19: 1175-1180, 1927) describe in detail their method of determining the mothproofing properties of chemicals. They give the following criteria of excellence for a mothproofing material: - it must

(1) be inodorous;

(2) adhere evenly to the fiber treated, like a dyestuff;

(3) be unrecognizable on the fiber;

(4) not dust off;

(5) not affect adversely the physical properties of the textile fibers;

(6) be soluble in inexpensive organic solvents, such as petroleum naphtha, as well as in water;

(7) have no untoward physiological action; that is, be nontoxic to human beings;

(8) repel clothes-moths;

(9) be reasonable in price from the industrial viewpoint.

Many materials of well established insecticidal value, for example, sodium fluoride, fail to satisfy all these requirements. Minaeff and Wright (Ind. Eng. Chem. 21: 1187-1195, 1929) and Moore (Ind. Eng. Chem. Anal. Ed. 2: 365-368, 1930) have also discussed methods of testing the efficacy of mothproofing agents.

Probable mention of a material in this index does not imply a recommendation of it by the author or by the Department of Agriculture; neither is any discrimination intended against any patent mention of which is inadvertently omitted. Most of the materials included in this list have never been placed on the market as mothproofing agents.

ABIETIC ACID.

Leaflets, soluble in alcohol.

Synonyms: abietinic acid, abietinsaeure, sylvic acid.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of abietic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; and U. S. Patent 1,739,840). For example, woolen rugs may be protected from attack by carpet beetles by spraying or dipping with a 5 per cent solution of titanium abietate.

ACETALDEHYDE.

Condensation products of acetaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

ACETALDEHYDE PHENYLCARBOXYLIC ACID ETHYL ESTER HYDRAZONE.

Synonyms: ethylidenephenylcarboxylic acid ethyl ester hydrazone; acide ethylidenephenylcarboxylique-ethylester-hydrazone; ethylidenehydrazone-phenylcarboxylic-acid-ethyl ester.

Ethylidenephenylcarboxylic acid ethylester-hydrazone is claimed for mothproofing purposes by Bayer and Company (British Patent 238,287; French Patent 581,037; and U. S. Patent 1,562,510).

ACETALDEHYDE PHENYLHYDRAZONE.

Synonyms: aethylidenephenylhydrazon, ethylidenephenyldydrazone.

Ethylidenephenylhydrazone is one of the materials claimed for mothproofing purposes by Bayer and Company (British Patent 238,287 and German Patent 402,341).

ACETAMIDE.

Colorless needles, soluble in water and alcohol.

Synonyms: acetamide, acetamine, acetic acid amide, acetic acid amine, aethanamid, essigsaeureamid, ethanamide.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report acetamine to be ineffective for mothproofing.

ACETANILIDE.

Crystals, soluble in alcohol and ether; 100 cc. water at 25° C. dissolves .54 gram acetanilide.

Synonyms: antifebrin, phenylacetamide.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) found acetanilide in concentrations up to 2 per cent in acetone ineffective for mothproofing.

ACETANILIDE, CHLORO.

Three isomers are known.

Chloroacetanilide, in concentrations up to 2 per cent in acetone, was ineffective for mothproofing. (Minaeff and Wright, Ind. Eng. Chem. 21: 1187, 1929).

ACETANILIDE, TRICHLOROETHYL.

Synonym: trichloraethylacetanilid.

Trichloroethylacetanilide is an example of a halogenated aromatic acylalkylamine claimed by Straub (German Patent 419,464) for mothproofing wool.

ACETIC ACID.

Colorless liquid, soluble in alcohol and water.

Synonyms: acid methanecarboxylic, acidum aceticum, aethansaeure, essigsaeure, methan-carbonsaeure, vinegar acid.

Acetic acid is given as an example of an organic acid present in solutions of sodium fluoride and sodium fluosilicate claimed in U. S. Patent 1,634,791; British Patent 235,915.

Pyroligneous acid, which is a crude acetic acid, is used for mothproofing curled hair according to U. S. Patent 369,739.

Acetic or sulphuric acid may be used in combination with the sodium salt of 4-chloro-1-phenol-2: 6-disulpho-bis-4'chloroanilide (British Patent 324,962).

ACETIC ACID, ACETYLPHENYLAMINO.

Acetylphenylaminoacetic acid is claimed by Fr. Bayer & Co., (French Patent 518,821) for mothproofing wool.

ACETIC ACID, PHENYL.

White plates, soluble in alcohol and ether, insoluble in water.

Synonyms: alpha-toluic acid.

Phenyl acetic acid is one of the materials claimed for mothproofing purposes in German Patent 346,596. For example, goods are treated a long time in a 4 per cent solution of phenylacetic acid in benzol at 50° C., centrifuged and dried with or without the application of heat.

ACETONE.

Colorless liquid, soluble in water, alcohol, and ether.

Synonyms: aceton, dimethylketal, dimethylketon, dimethylketone, ketopropane, methylacetyl, beta-oxopropan, propanon, propanone, 2-propanone, pyroacetic ether.

Acetone is mentioned as a solvent for cinchona alkaloids (U. S. Patent 1,615,843; Swiss Patent 125,139) and for hexachloroethane (German Patent 353,682).

Naefe (U. S. Patent 1,480,289) adds acetone to an alcoholic solution of antimony tannate which is used for mothproofing, so that when colored articles are treated the dyes will not be detrimentally affected.

Acetone is used as a solvent for thiourea or phenylthiourea mothproofing solutions by the Larvex Corp. (British Patent 301,421; U. S. Patent 1,748,579). For example, 2 parts of thiourea are dissolved in a mixture of 88 parts of water and 12 parts of acetone. To this solution .3 part of sulphonated castor oil is added. The fabric is immersed in the solution, excess liquid is pressed out and the material is air dried. Minaeff and Wright (Ind. Eng. Chem. 21: 1187, 1929) have used acetone as a solvent for urea and its derivatives. Acetone is also used by Minaeff (U. S. Patent 1,748,580) as a suitable solvent for allyl thiourea, orthotolyl thiourea and other thioureas in which one amino group contains no substitute for hydrogen.

Acetone is used as a solvent for the alkyl derivatives of naphthalene sulphonic acid for mothproofing purposes by Ritter (British Patent 313,043).

Acetone is mentioned as a solvent for borofluoroacetic acid and other complex borofluoro compounds in French Patent 661,931.

p-ACETOPHENETIDINE.

Colorless crystals, soluble in water, alcohol and ether.

Synonyms: p-acetamidophenetol, p-acetaminophenylaethylaether, p-acetophenetide, acetphenetidine, para-acetphenetidine, acet-p-phenetidine, acetyl-p-phenetidine, ethoxy-acetaminophenol, oxyethyl-acetanilide, phenacetin, azet-p-phenetidin, azetyl-p-phenetidin.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report acetophenetidine to be ineffective for mothproofing. Azetyl p-phenetidin is claimed for mothproofing wool in German Patent 346,597.

ACETYLSALICYLIC ACID.

Soluble in alcohol and ether, slightly soluble in water.

Synonyms: acetosal, acetosalin, acetosalic acid, aceto-salicylic acid, acety sal, aletodin, anglopyrin, aspirin, coxpyrin, helicon, salacetin, xaxa.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report acetylsalicylic acid to be ineffective for mothproofing.

ACIDS (see under specific acids, acetic, benzoic, etc.)

Acids (for instance, sulphuric and formic acids) are specified as ingredients which may be added to cold water together with other materials for mothproofing. For example, a mothproofing bath contains 1 per cent fluotitanic acid, 2 per cent zinc sulphate, 10 per cent Glauber's salt, and 3 per cent formic acid, calculated upon the weight of the wool. (Bayer and Company, German Patent 347,849).

ACIDS, CARBOXYLIC, HYDROXY.

Salicylic acid is one of this type.

I. G. Farbenindustrie (British Patent 274,425) claims the process for protecting material against moth attack, which consists in treating it with an ortho-hydroxy-carboxylic acid or derivatives thereof, in which the para position to the hydroxyl group is occupied by halogen or sulphur.

According to the I. G. Farbenindustrie (British Patent 299,055) wool or fur is moth proofed with a cold aqueous solution of a non-halogenated, non-sulphonated hydroxy carboxylic acid, or a substitution product thereof. Examples are salicylic acid, methyl hydroxy benzoic acids and resorcylic acid.

French Patent 661,727 covers the use of non-halogenated aromatic hydroxy-carboxylic acids and their substitution products. Salicylic acid is given as an example.

ACIDS, FATTY

Higher fatty acids and their salts are used as carriers for toxic substances in the mothproofing solutions claimed by the Larvex Corp. (British Patent 236,218).

Rare earth salts (cerium, lanthanum, didymium, thorium, zironium, uranium, titanium and thallium) of fatty acids are claimed for mothproofing by Kendall (British Patent 247,242).

Fatty acids have mothproofing properties, according to Jackson and Wassell (U. S. Patent 1,694,219).

ACIDS, NONHALOGENATED, NONSULPHONATED CARBOXYLIC.

Examples are benzoic and salicylic acids.

According to the I. G. Farbenindustrie (British Patent 299,055) wool or fur is mothproofed with a cold aqueous solution of a non-halogenated, non-sulphonated carboxylic acid, or a substitution product thereof.

Aromatic or heterocyclic carboxylic acids are used for mothproofing purposes according to (French Patent 518,821).

ACIDS, ORGANIC.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of a "higher organic acid" are claimed for mothproofing by Kendall (British Patent 247,242).

Organic acids are claimed by the Larvex Corporation as ingredients of mothproofing solutions (British Patents 235,915 and 236,218 and U. S. Patent 1,634,791).

ACORUS CALAMUS L.

Synonym: sweet flag, calamus.

Lawton (British Patent 13,071 of 1909) prepares a decoction by boiling 10 pounds of sweet flag root in 1 gallon of water till it is reduced to 2 pints. This quantity is added to 100 pounds of paper pulp during the process of manufacture in order to render the paper insect proof. A rosin soap containing naphthalene may be used with this. Fabrics are also rendered insect proof with this preparation.

ACRIDINE.

Sulphonic and carboxylic derivatives of acridine are claimed for mothproofing purposes in German Patent 344,266.

ALCOHOL.

Colorless liquid, miscible with water.

Synonyms: cologne spirit, ethanol, ethyl alcohol, fermentation alcohol, grain alcohol, spirits of wine.

Alcohol is mentioned as a suitable solvent for organic mothproofing materials, such as quinidine sulphate (U. S. Patent 1,615,843; Swiss Patent 125,139; oil of patchouli (U. S. Patent 1,605,202); anitomy tannate (U. S. Patent 1,480,289); paradichlorobenzene (U. S. Patent 1,097,406; British Patent 19,688 of 1912) and quinoidine combined with fatty acids (U. S. Patent 1,694,219). "Pyromoth", a mixture of calcium chloride, formaldehyde, benzoic

acid, ethyl-alcohol and water, has offered very good protection from the ravages of fabric pests, but has discolored and otherwise adversely affected some fabrics (Back and Cotton, Fur. Warehouseman 8: p. 800, 1927).

Alcohol is used as a solvent for the alkyl derivatives of naphthalene sulphonic acid for mothproofing purposes by Ritter (British Patent 313,043).

Alcohol is mentioned as a suitable solvent for borofluoroacetic acid and other borofluoro complex compounds in French Patent 661,931.

Scott, Abbott and J. E. Dudley, Jr. (U. S. D. A. Bull. 707: p.26) state that a 95 per cent solution of ethyl alcohol when used as a spray proved effective against moth larvae.

A mixture of alcohol and benzene is used as a solvent for tin triethyl-fluoride for spraying on fur (U. S. Patent 1,744,633; British Patent 303,092).

Ethyl alcohol is a suitable solvent for making solutions of phosphoric acid aryl esters for mothproofing purposes (U. S. Patent 1,748,675; German Patent 480,180).

Alcohol is used as a solvent for phosphonium compounds, for example, benzyltriphenylphosphonium chloride and benzyltriethylphosphonium chloride, used for mothproofing fabrics (British Patent 312,163).

ALDOL.

Colorless liquid, miscible with water, alcohol and ether.

Synonyms: 8-oxybutyraldehyde, butanolal-3, 3-butanolal, oxybutyric acid.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report aldol to be ineffective for mothproofing.

ALGINIC ACID.

Synonyms: algic acid, algin.

Woolen fabrics are impregnated with a soluble salt of alginic acid and then placed in a bath of antimony salt (Naefe, German Patent 304,506, and British Patent 160,039).

ALIZARINE SAPHIROL SE.

According to the I. G. Farbenindustrie (British Patent 295,742; German Patent 468,914; and French Patent 646,479) wool is mothproofed as follows: 100 kilograms of the material are treated in a dye bath with 1 kilogram of alizarine saphirol SE (See Schultz Farbstofftabelle 1914, no. 858), 15 kilograms acid potassium tartrate and 2 kilograms acid ammonium fluoride $(NH_4F)HF$ in the customary manner. After rinsing the goods are completely immune to attack.

ALKALOIDS.

Alkaloids from Lupinus (especially L. albus, angustifolius, luteus, niger, and perennis) seeds are claimed for mothproofing purposes in U. S. Patent 1,610,167.

Cinchona alkaloids are claimed for mothproofing purposes by Jackson and Wassell (U. S. Patent 1,615,843 and British Patent 263,092). See also, Loewenstein (Austrian Patent 99,430) for use of quinine, and report by Back and Cotton (Fur. Manufacturer, n.s. 35: p. 36, 1928) for tests of efficacy.

ALLSPICE.

The berry of the pimiento (Pimenta pimenta) a myrtaceous tree of the West Indies. According to Back (U.S.D.A. Farmers' Bul. 1353: p. 27, 1923) allspice dusted upon woolens is ineffective for protecting them against clothes moths. Also listed by Mullin (Textile Colorist, 47: p. 229, 1925). Scott, Abbott and J. E. Dudley, Jr. (U.S.D.A. Bul. 707: p. 26, 1918) state that allspice has no value in preventing moth infestation.

ALOIN.

Yellow, bitter crystals, derived from barbadoes aloes, soluble in alkalies, slightly soluble in water and in alcohol.

Synonyms: barbaloin.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report aloin to be ineffective for mothproofing.

ALUM.

The term "alum" strictly refers to double sulphates of aluminum and another metal; but is commonly incorrectly used by paper makers and tanners, to refer to various grades of aluminum sulphate. Ordinary alum is aluminum potassium sulphate, $Al_2(SO_4)_3K_2SO_4=24\ H_2O$. This occurs as white crystals. One hundred parts of water dissolve 11.40 parts of potash alum at 120° C.

Synonyms: alum, alum flour, alum meal, alumen, alumnite (native), common alum, cube alum, octahedral alum salt, potash alum, potassii alumini sulphas, sulphate of aluminum and potassium.

Bayer and Company (British Patent 173,536) mentions alum as an ingredient of a mothproofing solution. For example, 100 parts of wool are steeped over night in a bath consisting of 3 parts antimonic acid dissolved in 2 parts hydrofluoric acid, 3 parts concentrated sulphuric acid, and 3 parts alum, after which the wool is rinsed and dried.

Alum is an ingredient of mothproofing compositions described in the following patents: British Patents 13,071 of 1909; 235,914; 235,915 and 313,043; U. S. Patent 1,634,790; 1,634,791; 1,634,793; 1,634,794 and 1,682,975.

Jackson and Wassell (Ind. Eng. Chem. 19: 1177) have found potassium alum ineffective for mothproofing.

ALUMINUM ACETATE.

There are two commercial aluminum acetates: (a) normal $Al(C_2H_3O_2)_3$: and (b) basic $Al(C_2H_3O_2)_2OH$. Normal aluminum acetate is an amorphous white powder, soluble in water.

Synonyms: alumini acetas, aluminic acetate, fluid gelatine, mordant salts, oil pulp, printer's acetate, red liquor waterproofing salts.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report aluminum

acetate to be an ineffective mothproofing agent. Goods which have been treated with mothproofing materials (for example, hydrofluosilicic acid) are treated with metallic salts (for example, aluminum acetate) to form insoluble precipitates (German Patent 347,723).

ALUMINUM AMMONIUM FLUORIDE.

Easily soluble in water but insoluble in an aqueous solution of ammonium fluoride.

Bayer and Company give the double compound of aluminum fluoride with ammonium fluoride as an example of a salt of hydrofluoric acid suitable for mothproofing materials, according to the process described by them in United States Patent 1,682,975. For example, 100 parts of wool are placed in a cold solution (5,000 parts water), containing 4 parts of the double salt of aluminum fluoride with ammonium fluoride having most probably the formula $AlF_6(NH_4)$, 3 parts aluminum sulphate and 3 parts concentrated sulphuric acid. After 2 hours the goods are rinsed and dried.

ALUMINUM FLUORIDE.

The following aluminum fluorides are known: AlF_3; AlF_3 1/2 H_2O; AlF_3H_2O; AlF_3 3-1/2H_2O (two modifications); AlF_37H_2O; AlF_38-1/2H_2O. The commercial article, which is described as having the formula Al_2F_6. 7 H_2O. is a white crystalline powder, soluble in water. One hundred cc. water at 25° C. dissolve 0.599 gram AlF_3.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report aluminum fluoride to be an ineffective mothproofing agent. Also a combination of aluminum fluoride, aluminum sulphate, ammonium fluoride, and sulphuric acid in water is stated to be ineffective.

Bayer and Company (British Patent 173,536) claims a process for protecting wool, furs, skins, and hair from moths with a number of materials, one of which is aluminum fluoride. For example, 100 parts of wool are placed in a cold solution of 3 parts aluminum fluoride, 1 part ammonium fluoride, 3 parts aluminum sulphate, and 3 parts concentrated sulphuric acid. After two hours the goods are rinsed and dried.

Turner (U. S. Patent 1,494,085) claims an insect-repellent animal fiber having incorporated therein the products resulting from the aqueous interaction of a salt of naphthalene sulphonic acid, a sulphate, and a metallic fluoride, for example, aluminum fluoride.

In U. S. Patent 1,516,182 Turner claims a process of rendering fibers mothproof which comprises treating the fiber with formic acid and then with a solution of the product produced by treating a solution of zinc salt of naphthalene monosulphonic acid with zinc sulphate and aluminum fluoride.

Aluminum fluoride is one of the soluble fluorides claimed by the Larvex Corporation. (U. S. Patents 1,634,790; 1,634,791) in a mothproofing composition.

The I. G. Farbenindustrie (French Patent 636,434; German Patent 469,256) renders furs resistant to mites by rolling them in a drum with wood flour that has been treated with a salt of hydrofluoric acid, such as aluminum fluoride.

The Farbenfabriken (formerly F. Bayer & Co.) Leverkusen claims hydrofluoric acid and its salts, such as aluminum fluoride for mothproofing (German Patent 347,722; U. S. Patent 1,682,975; French Patent 518,821).

ALUMINUM FLUOSILICATE.

White powder, 100 cc. water at 15° C. dissolve 4.0 g. aluminum fluosilicate.

Synonyms: aluminum silicofluoride.

Aluminum fluosilicate is one of the materials claimed for mothproofing by the Larvex Corporation (U. S. Patents 1,634,790 and 1,634,791).

Back and Cotton (U. S. Yearbook of Agriculture, 1927, p. 466) state that water solutions of aluminum silicofluoride and sodium fluoride when used to drench fabrics thoroughly are of value.

ALUMINUM HYDROXIDE

Haberkorn (British Patent 313,771) waterproofs and mothproofs woolen and silk goods by impregnating them with an aqueous suspension of aluminum hydroxide, the amount of the hydroxide being at most 5 per cent of the dry weight of the goods.

ALUMINUM PALMITATE.

Yellowish-white mass, insoluble in water.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report this to be an ineffective mothproofing agent.

ALUMINUM SALTS.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moths by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of * aluminum, **, etc. may be added, and the materials may be used in aqueous solution or in dry-cleaning solvents, such as hydrocarbons, benzene, naphtha, alcohol, and acetone. Other insect repelling substances, such as sodium fluoride or silico-fluoride, may be added. The preparation may be applied during dyeing or other processes. For example, 10 pounds of a butyl naphthalene sulphonic acid, and 4 pounds of aluminum sulphate are dissolved in 100 gallons of water, and the material is treated in this for 15 minutes at 120° F.

Another mothproofing solution may be made by adding 5 pounds of amyl naphthalene sulphonic acid, 5 pounds of sodium silico-fluoride and 4 pounds of alum to 100 gallons of water.

Bayer and Company (German Patent 347,723) employ Al salts which will form insoluble salts with complex inorganic acids, for mothproofing.

Aluminum salts are given as ingredients of a mothproofing solution claimed by Bayer and Company (German Patent 347,849).

The aluminum salts of naphthalene α-mono-sulphonic acid and naphthalene -β-mono-sulphonic acid are used by Turner (U. S. Patent 1,494,085) in a mothproofing solution.

ALUMINUM SOAP.

Aluminum soap solution in naphtha followed by ammonia in naphtha was found by Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) to be ineffective in mothproofing wool.

ALUMINUM SULPHATE.

Aluminum sulphate may be $Al_2(SO_4)_3$ or $Al_2(SO_4)_3.18H_2O$. One hundred parts of water at 20°C. dissolve 36.15 parts of the former or 107.35 parts of the latter.

Synonyms: alumini sulphas, aluminic sulphate, cake alum, concentrated alum, neutral sulphate of aluminum, patent alum, sesquisulphate of aluminum, vitriolate of aluminum; sometimes erroneously called alum.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) found aluminum sulphate in combination with aluminum fluoride, ammonium fluoride, and sulphuric acid in water to be ineffective for mothproofing.

Bayer and Company (British Patent 173,536) use aluminum sulphate in the following mothproofing process: 100 parts of wool are placed in a cold solution of 3 parts aluminum fluoride, 1 part ammonium fluoride, 3 parts aluminum sulphate, and 3 parts concentrated sulphuric acid. After two hours the goods are rinsed and dried.

Aluminum sulphate is one of the compounds entering into the composition of a mothproofing solution used by Turner (U. S. Patents 1,494,085 and 1,515,182).

Aluminum sulphate is also one of the ingredients of the mothproofing composition claimed by the Larvex Corporation (U. S. Patents, 1,634,790 and 1,634,791; British Patents 235,914 and 235,915).

Meckbach (U. S. Patent 1,682,975 uses aluminum sulphate as follows: 100 parts of wool are placed in a cold solution (5,000 parts water) containing 4 parts of the double salt of aluminum fluoride with ammonium fluoride having most probably the formula $AlF_6(NH_4)_6$, 3 parts aluminum sulphate, and 3 parts concentrated sulphuric acid. After two hours the goods are rinsed and dried.

Ritter (British Patent 213,043) uses 4 lbs. aluminum sulphate; with 10 lbs. butyl naphthalene sulphonic acid in 100 gallons of water for mothproofing.

AMARINE.

Insoluble in water and ether. Soluble in alcohol and chloroform.
Synonyms: 4,5-dihydro-2,4,5-triphenylimidazole, triphenyldihydroglyoxaline.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report amarine to be ineffective for mothproofing.

AMINES.

Halogenated aromatic acylalkylamines are claimed for mothproofing purposes in German Patent 419,464.

AMMONIA.

Wildt (German Patent 272,822) impregnates materials with formaldehyde solution followed by an aqueous solution of ammonia to form hexamethylenetetramine in the impregnated material and protect it against insects.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177, 1927) state that aluminum soap solution in naphtha, followed by ammonia in naphtha, proved ineffective as mothproofing agents.

AMMONIUM FLUORIDE.

White crystals, very soluble in water.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report ammonium fluoride and also a mixture of aluminum fluoride, aluminum sulphate. ammonium fluoride and sulphuric acid in water to be ineffective for mothproofing.

Ammonium fluoride is one of the ingredients of the mothproofing composition claimed by Turner (U. S. Patents 1,494,085 and 1,515,182).

Bayer and Company (British Patent 173,536) gives the following example of a mothproofing solution: 100 parts of wool are placed in a cold solution of 3 parts aluminum fluoride, 1 part ammonium fluoride, 3 parts aluminum sulphate, and 3 parts concentrated sulphuric acid. After two hours the goods are rinsed and dried.

Ammonium fluoride may be added to fluosulphonates for preserving porous organic material (U. S. Patent 1,448,276).

AMMONIUM FLUOSULPHONATE.

Ammonium fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials..

AMMONIUM FLUOTITANATE

White powder, soluble in water.

Synonym: ammonium titanium fluoride.

This is one of the materials claimed by Bayer and Company (British Patent 173,536) for mothproofing wool.

AMMONIUM HYDROGEN FLUORIDE.

Soluble in water.

Synonyms: ammonium bifluoride; acid ammonium fluoride.

The I. G. Farbenindustrie (German Patent 468,914 and British Patent 295,742) protects wool, pelts, etc. against moths by acid fluoride salts of the general formula $MF(HF)n$. Ammonium bifluoride is given as an example.

Acid ammonium fluoride is used in combination with alizarine saphirol SE and acid potassium tartrate for mothproofing purposes (British Patent 295,742; French Patent 646,479).

AMMONIUM MOLYBDATE.

White crystalline powder, soluble in acids.

This is one of the constituents of a solution described by Bayer and Company (British Patent 173,536; German Patent 347,720) as suitable for mothproofing wool. For example, 100 parts of wool are placed in a cold bath consisting of 2 parts ammonium molybdate and 10 parts nitric acid and while the goods are continually agitated a dilute solution of 1 part sodium phosphate is gradually added. The goods are allowed to remain for a few hours and are then rinsed and dried.

Ammonium molybdate, in combination with nitric acid and sodium phosphate in water, proved ineffective as a mothproofing agent according to Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177, 1927).

AMMONIUM OLEATE.

The Graesser-Monsanto Chemical Works, Lt. (British Patent 253,993) mothproofs fabrics by immersion in an emulsion obtained by dilution of the following mixture: 25 parts monochloronaphthalene; 25 parts trichloronaphthalene; 47 parts water and 3 parts ammonium oleate.

Alcoholic ammonium oleate is used to emulsify monochloronaphthalene in water for the treatment of fabrics (British Patent 261,241).

AMMONIUM PHOSPHATE.

White crystalline material. It is readily soluble in water; 100 grams of water dissolve 131 grams of ammoniumphosphate at 15°.

Synonyms: ammonium diphosphate, diammonium orthophosphate.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) found ammonium phosphate to be ineffective for mothproofing wool.

AMMONIUM SULPHATE.

Ammonium sulphate may be added to fluosulphonates for preserving porous organic materials. (U. S. Patent 1,448,276).

AMYL ALCOHOL.

There are 8 amyl alcohols.

Synonyms: fusel oil, grain oil, ordinary commercial amyl alcohol is isoamyl alcohol b.p. 130°, also called fermentation amyl alcohol, potato spirit.

Amyl alcohol is mentioned as a suitable solvent for benzilic acid for mothproofing purposes in German Patent 346,596. For example, 5 parts by weight of benzilic acid are dissolved in 100 parts by weight of amyl alcohol to make a mothproofing solution.

ANGELICA ROOT

Root of Archangelica officinalis.

Back (U.S.D.A. Farmers Bulletin 1353, p. 27) states that angelica root (dusted) is worthless for clothes moth control. See also Mullin (Textile colorist 47: p. 229).

Scott, Abbott and J. E. Dudley, Jr. (U.S.D.A. Bull. 707, p. 26) state that angelica root (dusted) proved ineffective against clothes moth larvae.

ANILINE.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) state that aniline up to 20 per cent in water is absolutely useless for mothproofing.

ANILINE FLUOSULPHONATE.

Three isomers, ortho, meta, and para are possible.

Aniline flucsulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

ANTHRACENE.

Yellow crystals, insoluble in water, 100 cc. alcohol at 15° dissolve 0.56, and 100 cc. ether at 15° dissolve 1.17 anthracene.

Synonyms: anthracene oil, anthracin, para-naphthalene.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report anthracane to be ineffective for mothproofing.

Sulphonic and carboxylic derivatives of anthracene are claimed for mothproofing purposes in German Patent 344,266.

ANTHRACENESULPHONYL CHLORIDE.

Anthracenpechsulfosaeurechlorid is used, with or without a solvent, for mothproofing. (German Patent 449,126).

ANTHRAQUINONE.

Yellow needles, insoluble in water, soluble in alcohol, slightly soluble in ether.

Synonyms: dihydrodiketoanthracene, diketo-dihydroanthracene, diphenylene diketone.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report anthraquinone to be ineffective for mothproofing. The sulphonic and carboxylic acid derivatives of anthraquinone are claimed for mothproofing purposes in German Patent 344,266.

ANTIMONIC ACID

White powder, soluble in water.

This is one of the materials claimed by Bayer and Company (British Patent 173,536; U. S. Patent 1,682,975) for mothproofing wool. For example: 100 parts of wool are steeped over night in a bath (5,000 parts water) consisting of 3 parts antimonic acid dissolved in 2 parts hydrofluoric acid (to form $SbF_3 4HF$), 3 parts concentrated sulphuric acid and 3 parts alum. The wool is then rinsed and dried.

ANTIMONIOTUNGSTIC ACID.

Synonyms: antimony tungstic acid; antimonwolframsaeure.

This is one of the materials claimed by Bayer and Company (British Patent 173,536; German Patent 347,720; French Patent 518,821) for mothproofing wool.

ANTIMONY ALGINATE.

Naefe (British Patent 160,039; German Patent 304,506) claims a

method of protecting woolen fabrics from moths which consists in impregnating the cloth with a soluble salt of alginic acid, and then placing it in a bath of antimony salt. For example, a 1-1/2 to 2 per cent solution of alginate of soda may be used for impregnating the cloth on a gumming machine, the cloth being then transferred to a bath of antimony salt kept up as a 5 per cent solution. Then the cloth is dried, whereby an insoluble antimony combination will be precipitated on the fibers. Superfluous antimony salt is then removed by rinsing, after which the cloth is finished in the usual manner.

ANTIMONY SALTS.

The use of antimony salts in mothproofing woolen goods is described in the following patents: British Patent 160,039 and German Patents 304,506, 347,849 and 430,186. Soap containing antimony (salt) is used to impregnate woolens by Naefe (German Patent 416,706).

ANTIMONY TANIATE.

According to the process of Blanckе (German Patent 430,186) antimony tannate is precipitated on the woolen fibers by dipping the wool first in a solution of tannic acid and then in a solution of tartar emetic.

Naefe (U. S. Patent 1,480,289) mothproofs by applying an alcoholic solution of antimony tannate or by treating with tannin and then with a solution of antimony salt, which precipitates antimony tannate in the fibers of the goods. For example (British Patent 160,039), cloth is treated for two hours in a hot bath containing 3 per cent tannin as compared with the weight of the cloth, which is left in the bath to cool. Then the liquid is squeezed out in a machine, and the cloth is placed in a 3 per cent solution of an antimony salt. After an hour in this bath, the cloth may be rinsed and dried and then finished in the usual manner.

ANTIPYRINE.

White crystalline powder. Solubility: 100 g. in 100 cc water; 100 g. in 100 cc. alcohol; 3.3 g. in 100 cc. ether.

Synonyms: analgesine, anodynine, dimethyloxyquinizine, 2.3-dimethyl-1-phenyl-5(2)-pyrazolone, oxydimethylquinizine, phenazone, phenyl-dimethylpyrazole, phenylene, phenyl-methyl-isopyrazolone, phenyl-methyl-phenazone, pyrazine, pyrazoline, sedaline.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report antipyrine to be ineffective for mothproofing. Flannel treated with antipyrine and oleic acid was quickly damaged by clothes moth larvae, according to Minaeff and Wright (Ind. Eng. Chem. 21: 1187, 1929).

ARSENIC.

By the term "arsenic", white arsenic, which is essentially arsenic trioxide (As_2O_3), is usually understood.

Synonyms: acidum arsenosum, anhydrous arsenious acid, anhydrous arseniosum, arseni trioxidum, arsenic blanc, arsenici oxidum, arsenicum album, arsenious acid, arsenious anhydride, arsenious oxide, arsenolite (native), flowers of arsenic, metallum album, poison flour.

White arsenic is one of the ingredients of the following mothproofing mixtures claimed by Seynaeve (French Patent 545,930), 1,000 grams white soap, 125 grams potassium carbonate, 250 grams basic bismuth nitrate, 1,000 grams of arsenic and 1 liter of water.

Back and Cotton (Fur. Manufacturer, New Series Vol. 35, p. 36) state "Solutions containing arsenic in any form should be avoided. They are not only likely to be dangerous, but they have proved the least effective of the solutions tested by the Department of Agriculture."

Stagner (United States Patent 1,558,122) proofs hair felt against moths, beetle larvae, and the like by spraying with a solution of 10 gallons of water, 43 pounds soda ash crystals, 10 pounds white arsenic, 1 pound glue and 1/4 to 1/2 pound of soap.

According to Back and Cotton (Yearbook of Agriculture, 1927, p. 465) mothproofing solutions depending upon any form of arsenic are among the least dependable of the solutions offered the public.

Mullin (American Dyestuff Reporter, 14: p. 333, 1925) mentions arsenic powder as being more or less successful in combating moths.

ARSENIC COMPOUNDS.

Synonyms: arsenic pentoxide is known as anhydrous arsenic acid, arsenic acid anhydride, arsenic anhydride, arsenic oxide; sodium arsenate is also known as dung salt.

The Larvex Corporation (British Patent 236,218) states that any arsenic compound may be employed as the toxic agent in mothproofing wool according to its process.

"Larvex" as it first appeared on the market contained arsenic equivalent to 0.05 per cent arsenic pentoxide (Back and Cotton, Fur. Warehouseman 8: p. 800; J. Am. Med. Assoc. April 14, 1923, v. 80 p. 1072).

"Speadlin's Odorless Moth-Proof," manufactured in California, is a solution of sodium arsenite and arsenic trioxide; "Carter's Mothproof," manufactured in [illegible], California, contains sodium arsenite and sodium arsenate; and "American Odorless Mothproof," manufactured in Chicago, Illinois, contains arsenic trioxide (Back and Cotton, Fur. War. 8:, p. 800).

Mullin (Textile Colorist 47: p. 163) lists "arsenic powder" as a clothes moth preventive.

ARSINE, TRIBENZYL.

Crystals, melting point 140° , slightly soluble in hot alcohol. Insoluble in water, easily soluble in ether, benzene and acetic acid.

Synonyms: tribenzyl arsin.

Tribenzyl arsine is one of the compounds in which arsenic is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

ARSINE, TRI-DIMETHYLAMINOPHENYL.

Tri-dimethylaminophenyl arsine is one of the compounds in which arsenic is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

ARSINE, TRIPHENYL.

Crystals, melting point 58-59°, insoluble in water, very slightly soluble in cold alcohol, but readily soluble in hot alcohol, from which it may be crystalized; readily soluble in ether and benzene.

Synonym: triphenyl arsin.

Triphenyl arsine is one of the compounds, in which arsenic is directly linked to a carbon atom, that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

ARSINE DIHYDROXIDE, TRIPHENYL.

White needles, melting point 115-116, comparatively easily soluble in water, easily soluble in alcohol and difficultly soluble in ether.

Synonym: triphenyl arsine hydroxide.

Triphenyl arsine dihydroxide is one of the compounds in which arsenic is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

AURAMINE O.

A diphenyl basic dyestuff that is the hydrochloride of iminotetramethyl-diamino-diphenyl-methane.

Synonyms: auramine; auramine I, II, and concentrated; aureum; pylak tannin; pyoktannin.

Minaeff (Textile Colorist 49: p. 89) found that wool dyed with auramine O was badly damaged by clothes moth larvae and black carpet beetle larvae.

BENZACETYLALPHENYLHYDRAZONE.

Synonym: benzylidenephenylacetylhydrazone.

Needles, melting point 122°. Insoluble in water, easily soluble in chloroform.

The I. G. Farbenindustrie (German Patent 460,545) claims compounds of the general formula RNXY (in which X may be nitrogen or carbon, Y may be nitrogen, carbon or a ring and R is any radical), for the protection of wool, pelts, etc. against moths. Benzylidenephenylacetylhydrazone is mentioned as an example.

BENZALAETHYLPHENYLHYDRAZON CARBONSAEURE.

Synonyms: benzylidenephenylethylhydrazonecarboxylic acid; benzylidenphenylaethylhydrazoncarbonsaeure.

The I. G. Farbenindustrie (German Patent 460,545) claims compounds of the general formula RNXY (in which X may be nitrogen or carbon, Y may be nitrogen, carbon or a ring, and R is any radical), for the protection of wool, pelts, etc. against moths. Benzylidenphenylaethylhydrazoncarbonsaeure is mentioned as an example.

BENZALBENZOLYPHENYLHYDRAZONE

Synonyms: benzylidenephenylbenzohydrazone; benzylidenphenylbenzoylhydrazon.

Needles, melting point 115. Easily soluble in alcohol and benzol.

The I. G. Farbenindustrie (German Patent 460,545) claims compounds of the general formula RNXY (in which X may be nitrogen or carbon, Y may be nitrogen, carbon or a ring, and R is any radical) for the protection of wool, pelts, etc. against moths. Benzylidenphenylbenzoylhydrazon is mentioned as an example.

BENZALDEHYDE.

Colorless oil, soluble in water, alcohol and ether.

Synonyms: artificial essential oil of almonds, benzoic aldehyde, benzoyl hydride.

Benzaldehyde mixed with phenol is claimed for mothproofing purposes in U. S. Patent 1,594,632.

Condensation products of benzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

BENZALDEHYDE, p-CHLORO-.

Condensation products of p-chlorobenzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

BENZALDEHYDE, 2, 6-DICHLORO-3-HYDROXY-.

Condensation products of 2,6-dichloro-3-hydroxy benzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

1-BENZALDEHYDE-2-SULPHONIC ACID.

Synonym: o-sulphobenzaldehyde.

Condensation products of o-sulphobenzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

1-BENZALDEHYDE-3-SULPHONIC ACID.

Synonym: m-sulphobenzaldehyde.

Condensation products of m-sulphobenzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

1-BENZALDEHYDE 5-SULPHONIC ACID, 2-CHLORO-.

Synonym: 2-chloro-5-sulphobenzaldehyde.

Condensation products of 2-chloro-5-sulpho benzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

BENZALDEHYDE, 2,4,6-TRICHLORO-3-HYDROXY-.

Condensation products of 2,4,6-trichloro-3-hydroxybenzaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

BENZALMETHYLPHENYLHYDRAZONE.

Synonyms: benzylidenephenylmethylhydrazone; benzylidenphenylmethylhydrazon.

The I. G. Farbenindustrie (German Patent 460,545) claims compounds of the general formula RNXY (in which X may be nitrogen or carbon, Y may be nitrogen, carbon or a ring, and R is any radical) for the protection of wool, pelts, etc. against moths. Benzylidenphenylmethylhydrazon is mentioned as an example.

BENZANILIDE.

Fabrics treated with benzanilide in concentrations up to 2 per cent in acetone were damaged by clothes moth larvae (Minaeff and Wright, Ind. Eng. Chem. 21: 1187, 1929).

BENZENE.

Colorless liquid, soluble in alcohol and ether, insoluble in water.

Synonyms: benzol, coal naphtha, phenyl hydride.

Benzene is mentioned as a suitable solvent for organic mothproofing compounds, for example, phenyl acetic acid and benzil in German Patents 346,596 and 346,597 respectively.

Benzene is a suitable solvent for cinchona alkaloids for mothproofing purposes (U. S. Patents 1,615,843 and 1,694,219; Swiss Patent 125,139).

Benzene is designated as a suitable solvent for pyrazolone and the other organic compounds claimed by Bayer and Company in U. S. Patent 1,562,510.

Naefe (U. S. Patent 1,480,289) adds benzene to an alcoholic solution of antimony tannate to prevent injury to the dye while mothproofing dyed fabrics.

Benzene is mentioned by Sachs (Textile Colorist 48: p. 527) as a clothes moth repellent.

Maxwell-Lefroy (British Patent 261,241) dissolves 1 part mono-chloronaphthalene in 10 parts benzene for mothproofing fabrics. A 5 per cent solution of trichloro- or hexachloronaphthalene in benzene is similarly employed (British Patent 253,993; U. S. Patent 1,725,656). Kendall (British Patent 247,242) mothproofs with a 1 per cent solution of lanthanum stearate in benzene.

Benzene is mentioned by Jackson and Wassell (U. S. Patent 1,694,219) as a suitable dry solvent for dissolving quinoidine combined with fatty acids.

Benzene is used as a solvent for mothproofing materials by Ritter (British Patent 313,043). For example, 8 pounds of neutralized propyl naphthalene sulphonic acid and 2 pounds of benzine soap are dissolved in 100 gallons of benzene for mothproofing purposes. Another example of the use of benzene as a solvent by Ritter is the following: 7 parts of neutralized amyl naphthalene sulphonic acid and 3 parts of oleic acid are dissolved in benzene to form a 1-1/2 per cent solution.

Benzene is used as a solvent for sulphochlorides (e.g. 1,5- naphthalenedisulphochloride) used for mothproofing (German Patent 449,126).

Benzene is used as a solvent for tin tetrabenzyl, and a mixture of benzene and alcohol is used as a solvent for tin triethylfluoride (U. S. Patent 1,744,633; British Patent 303,092).

BENZENE, CHLORO-.

Colorless liquid, soluble in alcohol and ether, insoluble in water.
Synonym: monochlorbenzol.

Monochlorobenzene may be used in place of paradichlorobenzene as a mothproofing material (British Patent 10,379 of 1914).

Chlorobenzene is used as a solvent for sulphochlorides (e.g. 1,5-naphthalene-disulphochloride) used for mothproofing (German Patent 449,126).

BENZENE, CHLORODINITRO-.

There are seven isomeric dinitrochlorobenzenes.
Synonyms: dinitrochlorobenzene; dinitrochlorbenzol.

Dinitrochlorobenzene may be used with phenol for mothproofing textiles (U. S. Patent 1,594,632).

BENZENE, 3-CHLORO-SULPHO-4′-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur hair, feathers and the like against attack by moth by treatment with an arylsulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R = an aromatic nucleus and R_1 and R_2 = hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 3-chlorobenzenesulpho-4′- chloroanilide is given as an example.

BENZENE, DICHLORO-.

There are three isomers:

ortho-colorless liquid; b.p. 179° C.
meta- colorless liquid; b.p. 173° C.
para- white volatile crystals; m.p. 52° C; b.p. 173° C.

Synonym: dichlorbenzols.

Dichlorobenzene is mentioned as a moth repellent in German Patent 344,266.

Dichlorbenzenes are used as solvents for sulphochlorides (e.g. 1,5-naphthalene-disulphochloride) used for mothproofing (German Patent 449,126).

BENZENE, m-DICHLORO-.

Synonyms: 1,3-dichlorobenzene, metadichlorbenzol.

Metadichlorobenzene may be used instead of paradichlorobenzene for protecting clothing against moths (British Patent 10,379 of 1914).

BENZENE, o-DICHLORO-.

Colorless liquid, soluble in alcohol and ether, insoluble in water.

Synonym: orthodichlorbenzol.

Orthodichlorobenzene may be used instead of paradichlorobenzene for protecting clothing against moths (British Patent 10,379 of 1914).

BENZENE, p-DICHLORO-.

Colorless crystals; soluble in alcohol and ether, insoluble in water.

Synonyms: dichloride, paracide, paradichlorobenzol.

According to Sachs (Textile Colorist, 48, p. 529), also Gassner (Chem. Tech. Fabrikant v. 55, p. 42, 1928) and Heeke (Ztschr. ges. Textil-Ind. 28, p. 376, 1925) one of the trade names for paradichlorobenzene is "Globol".

Paradichlorobenzene is listed as a moth repellent by Mullin (Textile Colorist, 47, p. 163); also by the same author in American Dyestuff Reporter, 14; no. 8, p. 323 (May 18, 1928); Gershenfeld (Hygeia, 3, p. 642); Meckbach (Textilberichte, 2: p. 350) and Kingzett (Chem. Encyclopedia 4th Ed. p. 471, 1928).

Ducket (U.S.D.A. Bull. 167, 1915) describes fumigation tests with paradichlorobenzene against stored product insects, roaches, mites on corn, ants, flies and aphids. The use of paradichlorobenzene for protecting furs, skins and similar objects against attacks of moths was first patented in British Patent 19,688 of 1912; German Patent 258,405 of 1911; and U. S. Patent 1,097,406 of 1914. The use of this material as a moth repellent is referred to in British Patent 10,379 of 1914.

Paradichlorobenzene may be used mixed with cedar-leaf oil or other essential oil for fumigating clothing in a tightly closed vault (Drushel, U. S. Patent 1,630,836).

Ross and Ross (U. S. Patent 1,594,632) mothproofs textiles with steam impregnated with about 5 per cent paradichlorobenzene and from .5 to 1 per cent phenol.

Schabik (German Patent 409,510 soaks gypsum blocks in a volatile disinfectant (formaldehyde, phenol, etc.) and then immerses the blocks in molten naphthalene or paradichlorobenzene or a mixture of the two, and then

in molten paraffin or similar material for use against moths and other injurious insects.

Paradichlorobenzene in upholstered furniture is of no value in protecting against fabric pests (Back and Cotton, Furniture Warehouseman, 8: p. 800).

Back (U.S.D.A. Farmers' Bull. 1353: p. 16) states that paradichlorobenzene is equal in effectiveness to naphthalene against clothes moths when they are exposed to it in tight containers.

The Graesser-Monsanto Chemical Works Ltd. (British Patent 253,993) insect-proof timber by impregnating it with a mixture of 1 part burning oil 300°, 1 part of paradichlorobenzene and 1 part of hexachloronaphthalene.

Sachs (Industrial Chemist, 3: no. 34, p. 505) mentions paradichlorobenzene as being effective against moths if used in closed containers.

White, Fulton and Cranor (Ent. News, 40: no. 4 pp. 117-121, April, 1929) state that paradichlorobenzene is a worthwhile moth remedy.

Scott, Abbott and J. E. Dudley, Jr. (U.S.D.A. Bull. 707, p. 28) state that paradichlorobenzene was ineffective against adults and larvae in a room fumigation test of 21 hours' duration, but killed larvae effectively in battery-jar tests.

BENZENE, 1:2-DICHLORO-4:6-DISULPHO-BIS-4′-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2 dichlorobenzene-4:6-disulpho-bis-4′-chloroanilide.

BENZENE, 1:3-DICHLORO-4:6-DISULPHO-BIS-4′-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an arylsulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$, in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 1:3 dichlorobenzene-4:6-disulphobis-4′-chloranilide is given as an example.

BENZENE, 1:4-DICHLORO-2:6-DISULPHO-BIS-4′-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects, wool, fur, hair, feathers and the like against attack by moth by treatment with 1:4-dichlorobenzene-2:6-disulpho-bis-4′-chloroanilide.

BENZENE, 1:2-DICHLORO-4-SULPHO-4′-FLUORO-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2-dichloro-4-sulpho-4′-fluoro-anilide.

BENZENE, 1:2-DICHLORO-4-SULPHOANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2-dichlorobenzene-4-sulphoanilide.

BENZENE, DINITRO-.

Melting points, ortho 116.5°, meta- 89.7°, para- 172.1°.

Synonym: dinitrobenzol.

Dinitrobenzene may be used with phenol for mothproofing textiles U. S. Patent 1,594,632).

BENZENE DISULPHONIC ACID, SODIUM SALT.

Three isomers are possible, ortho-, meta-, and para-.

Sodium benzene disulphonate is one of the ingredients of the moth-proofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790; British Patent 235,914).

BENZENE, TETRACHLORO-.

Tetrachlorobenzene is mentioned as a compound that may be present in the products obtained in the course of manufacture of chlorobenzenes which are used for protecting clothing, etc. against the attack of moths. (British Patent 10,379 of 1914).

BENZENE, TRICHLORO-.

Three trichlorobenzenes are known. 1,2,3; 1,2,4; and 1,3,5.

A trichlorobenzene may be used in place of paradichlorobenzene for protecting clothing against moths (British Patent 10,379 of 1914).

BENZENE, 1:2:5-TRICHLORO-4-SULPHO-4′-CHLORO-1′-ANILIDE-3′-SULPHO-BENZYLAMIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-4′-chloro-1′-anilide-3′-sulpho-benzylamide.

BENZENE, 1:2:5-TRICHLORO-4-SULPHO-4′-CHLORO-1′-ANILIDE-3′-SULPHO-PHENYLMETHYL-AMIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-4′-chloro-1′-anilide-3′-sulphophenylmethylamide.

BENZENE, 1:2:5-TRICHLORO-4-SULPHO-4′-METHYL-1′-ANILIDO-3′-SULPHO-1″-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers, and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-4′-methyl-1′-amilido-3′-sulpho-1″-anilide.

BENZENE, 1:2:5-TRICHLORO-4-SULPHO-3'-n-VALERYL-AMINO-4'-CHLORANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-3'-n-valerylamino-4'-chloroanilide. Material is impregnated with a 3 per cent benzine solution of this.

BENZENE, 1:2:5-TRICHLORO-4-SULPHOANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-anilide.

BENZENESULPHANILIDE, 4-CHLORO-.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-benzenesulphanilide.

BENZENE SULPHONIC ACIDS.

Synonym: benzolsulfosaeuren.

These compounds are claimed for mothproofing purposes in German Patent 344,266.

The Larvex Corporation uses benzene sulphonic acids, their alkali-metal salts, or derivatives thereof, in mothproofing solutions (British Patent 235,914). For example, a solution contains .1 to 2.5% sodium fluoride; .1 to .6% sodium fluosilicate; .1 to 1% sodium sulphate and .01 to .5% sodium benzene sulphonate.

BENZENESULPHONIC ACID, SODIUM SALT.

Sodium benzene sulphonate is one of the ingredients of the moth-proofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790; British Patent 235,914).

BENZENESULPHONIC ACIDS, CHLORO-.

Synonyms: chlorbenzolsulfosaeuren.

These derivatives are claimed for mothproofing purposes in German Patent 344,266. They are also included in the claims of the Larvex Corporation (British Patent 235,914).

BENZENESULPHONIC ACID, CHLORO-, SODIUM SALT.

Three isomers, ortho, meta, and para are possible.

Sodium chlorobenzene sulphonate is one of the ingredients of the mothproofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790; British Patent 235,914).

BENZENESULPHONIC ACIDS, NITRO-.

Synonym: nitrobenzolsulfosaeuren.

These compounds are claimed for mothproofing by Bayer and Company (German Patent 344,266).

BENZIDINE, N-N′-BIS(4-CHLORO-PHENYSULPHONYL)-3-AMINO (4-CHLOROPHENYLSULPHONYL).

Synonym: tris-4-chlorobenzene-sulpho-m-amino-benzidide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with tris-4-chlorobenzene-sulpho-m-amino-benzidide.

BENZIDINE, N-N′-BIS (2-5-DICHLORO-PHENYLSULPHONYL).

Synonym: bis-1:4-dichlorobenzene-2-sulphobenzidide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:4-dichlorobenzene-2-sulphobenzidide.

BENZIDINE, N-N′BIS(3,4-DICHLOR-PHENYLSULPHONYL)-3-3′-DISULPHONIC ACID.

Synonym: bis-1:2-dichlorobenzene-4-sulphobenzidide-m-m′-disulphonic acid.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulphobenzidide-m-m′-disulphonic acid.

BENZIDINE, N-N′BIS(2-HYDROXY-5-CHLORO-PHENYLSULPHONYL).

Synonym: bis-4-chloro-1-phenol-2-sulphobenzidide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-4-chloro-1-phenol-2-sulphobenzidide.

BENZIDIDE HYDROFLUORIDE.

Synonym: hydrofluoride of p,p′- bianiline.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report benzidine hydrofluoride to be ineffective for mothproofing.

BENZIL.

Yellow needles, soluble in alcohol and ether, insoluble in water.

Synonym: dibenzoyl.

Benzil is one of the materials claimed for mothproofing in German Patent 346,597. It is applied as a spray, 2 grams in 100 grams of benzol.

BENZILIC ACID.

Synonyms: diphenylglycolic acid, diphenylmethanolmethyl acid.

Benzilic acid is one of the materials claimed for mothproofing in German Patent 346,596. For example, 5 parts benzilic acid dissolved in 100 parts amyl alcohol are used to moisten goods to be protected. French Patent 518,821 mentions benzilic acid as an aromatic carboxylic acid suitable for mothproofing wool.

BENZINE (do not confuse with benzene which is benzol).

A mixture of the more volatile constituents of petroleum.

Synonyms: petroleum ether, canadol.

Benzine is mentioned as a suitable solvent for a soap containing antimony for mothproofing materials in German Patent 416,706.

It is also mentioned by Mullin (Textile Colorist 47: p. 163) as a clothes moth remedy.

Naefe (U. S. Patent 1,480,289) adds benzine to an alcoholic solution of antimony tannate to prevent injury to dyed fabrics by the mothproofing solution.

Packard (Guide to the Study of Insects, 9th ed. 1889, p. 347) states that clothes moths can be most readily killed by pouring benzine among them.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 14) recommends treatment of cracks and hiding places with benzine for the killing of fabric pests.

Benzine may be used as a solvent for sulphochlorides (e.g. 1,5 naphthalenedisulphochloride) used for mothproofing (German Patent 449,126).

The I. G. Farbenindustrie (U. S. Patent 1,748,675; German Patent 480,180) uses solutions of phosphoric acid aryl esters, for example a 2 per cent solution of diphenyl ortho-cresyl phosphoric acid in benzine for mothproofing.

Benzine is used as a solvent for 1:2:5-trichloro-benzene-4-sulpho-3'-valerylamino-4'-chloranilide used for mothproofing wool (British Patent 324,962).

BENZINE SOAP.

Ritter (British Patent 313,043) mothproofs with the following compositions: 8 pounds of neutralized propyl naphthalene sulphonic acid and 2 pounds of benzine soap dissolved in 100 gallons of benzene.

BENZOIC ACID.

Synonym: phenylformic acid.

Benzoic acid is a constituent of "Pyromoth" (Back and Cotton, Furnitute Warehouseman, 8: p. 800).

BENZOIC ACID. 2.4-DIHYDROXY.

Synonyms: resorcylic acid, β-Resorcylsaeure, ($C_7H_6O_4$).
2,4-phendiolmethylsaeure, 2,4-dioxybenzoesaeure.

Needles from ether, melting point 204.

The I. G. Farbenindustrie (British Patent 299,055; French Patent 661,727) uses nonhalogenated, nonsulphonated, hydroxy carboxylic acids for mothproofing wool or fur. Resorcylic acid is given as an example.

BENZOIC ACID. 3.5-DIHYDROXY-.

Synonums: α-resorcylsaeure, 3,5-phendiolmethylsaeure, and 3,5-dioxybenzoesaeure.

Needles, melting point 232.

Easily soluble in hot aqueous alcohol and ether.

The I. G. Farbenindustrie (British Patent 299,055) uses nonhalogenated, nonsulphonated, hydroxy carboxylic acids for mothproofing wool or fur. Resorcylic acid is given as an example.

BENZOIC ACID, DINITRO-.

There are five dinitrobenzoic acids described in Beilstein.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177 report dinitrobenzoic acid to be ineffective for mothproofing.

BENZOIC ACID, METHYLHYDROXY-.

Three isomers are known.

Methylhydroxy benzoic acids are claimed by the I. G. Farbinindustrie (British Patent 299,055), for mothproofing wool or fur.

BENZOIC ACID DISULPHIDE, BIS-HYDROXY.

The I. G. Farbenindustrie (British Patent 274,425) gives bis-hydroxybenzoic acid disulphide as an example of an ortho hydroxy carboxylic acid in which the para position to the hydroxyl group is occupied by sulphur, which is suitable for mothproofing purposes.

BENZOIN.

Yellowish crystals.

Synonyms: oxyphenylbenzylketone, phenylbenzoylcarbinol.

Benzoin is one of the mothproofing materials claimed in German Patent 346,597.

BENZOPHENONE.

Colorless prisms, soluble in alcohol and ether, insoluble in water.

Synonym: diphenylketone.

Benzophenone sulphonic and carboxylic acid derivatives are claimed for mothproofing purposes in German Patent 344,266.

BENZYLIDENEPHENYLHYDRAZONE.

Synonym: benzalphenylhydrazone.

Derivatives of this compound are claimed for mothproofing purposes by Bayer and Company (British Patent 238,287).

BENZYLIDENEPHENYLMETHYLHYDRAZONE SULPHONIC ACID.

Synonyms: benzalmethylphenylhydrazone sulphonic acid, phenylmethylhydrazone benzylidene sulphonic acid, acide benzylidene phenylmethylhydrazone sulfonique.

This is one of the compounds claimed for mothproofing purposes in U. S. Patent 1,562,510; and French Patent 581,037.

BETAINE FLUOSULPHONATE.

Betaine fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

BETAINE HYDROCHLORIDE.

Monoclinic crystals, readily soluble in water.
Synonyms: hydrochloride of trimethyl glycine, oxy-neurine, lycin.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report betaine hydrochloride to be ineffective for mothproofing.

BIPHENYL.

White scales, soluble in alcohol and ether, insoluble in water.
Synonym: diphenyl.

Sulphonic and carboxylic acid derivatives of diphenyls are claimed for mothproofing purposes in German Patent 344,266.

BISMUTH, WATER SOLUBLE SALTS OF.

Jones (U. S. Patent 1,688,717) uses water soluble salt of certain metals (bismuth included) for precipitating casein in fabrics in order to mothproof them.

BISMUTH BROMIDE, DIETHYL-.

Synonym: diethyl bismuth bromid.
Powder, ignites in air.

Diethyl bismuth bromide is one of the compounds in which bismuth is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092. For example, wool may be immersed in a 3 per cent solution of a mixture of triethyl bismuth bromide and diethyl bismuth bromide in acetone, washed with water, and dried.

BISMUTH BROMIDE, TRIETHYL.

Triethyl bismuth bromide is one of the compounds in which bismuth is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092. For example, wool may be immersed in a 3 per cent solution of a mixture of triethyl bismuth bromide and diethyl bismuth bromide in acetone, washed with water and dried.

BISMUTH NITRATE, BASIC.

White heavy powder, insoluble in water.
Synonyms: basic nitrate of bismuth, bismuth subnitrate, bismuth white, bismuthi oxynitras, bismuthi subnitras, bismuthum album, bismuthyl nitrate, blanc d'espagne, calx bismuthi, flake white, magistery of bismuth, oxynitrate of bismuth, paint white, pearl white, Spanish white.

Bismuth nitrate is one of the ingredients of the mothproofing composition claimed by Saynaeve (French Patent 545,930). The solution is made by mixing 1,000 grams white soap, 125 grams potassium carbonate, 250 grams blanc-d'Espagne, 1,000 grams white arsenic and 1 liter of water.

BISMUTHAL.

A mixture of bismuth phosphate and sodium salicylate.
Synonym: bismuthol.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report bismuthal to be ineffective for mothproofing wool.

BISMUTHINE, PHENYLDIBROMO-.

Synonym: bismuth phenyldibromide.

Crystals, melting point 205-206, soluble in hot benzene.

Bismuth phenyldibromide is one of the compounds in which bismuth is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092.

BISMUTHINE, TRIPHENYL-.

Synonyms: bismuth triphenyl; triphenylwismut.

Crystals, melting point 77-78, soluble in alcohol and water, less soluble in light petroleum.

Bismuth triphenyl is one of the compounds in which bismuth is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092; and German Patent 485,646.

BISMUTHINE, TRI-p-TOLYL-.

Synonyms: p-Bismuth tritoyl, bismuth tri-p-tolyl, tri-p-tolylwismut.

Long flaky prisms, melting point 120°.

Easily soluble in ether, chloroform, benzene and ligroin, difficultly soluble in cold water.

Bismuth tri-p-tolyl is one of the compounds in which bismuth is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

BITOLYL

Synonym: ditolyl.

Six isomeric bitolyls are possible.

Sulphonic and carboxylic acid derivatives of ditolyls are claimed for mothproofing purposes in German Patent 344,266.

BITTER EXTRACT.

A bitter extract is one of the materials which may be added to a solution containing sodium fluoride and sodium sulphate for mothproofing textiles (U. S. Patent 1,594,631).

BORAX.

White crystals or powder, soluble in water.

Synonyms: sodium biborate, sodium borate, tincal.

According to Millin (Textile Colorist, 47: p. 229), borax dusted over woolen goods is ineffective in protecting them against clothes moths.

Borax (dusted) is worthless for clothes moth control (Back, U.S.D.A. Farmers' Bulletin 1383, p. 27).

White, Fulton and Cranor (Ent. News, 40: p. 117) state that borax has no value as a mothproofing agent.

Scott, Abbott and J. E. Dudley, Jr. (U.S.D.A. Bull. 707, p. 26) state that borax (dusted) is ineffective against clothes moth larvae.

BRILLIANT GREEN.

A dye which is the sulphate or double zinc chloride of tetraethyl-diaminotriphenylcarbinol.

Synonyms: diamond green C; emerald green; ethyl green; fast green J; fast green S; malachite green C; now Victoria green. smaragagreen; solid green J; solid green TTO.

Minaeff (Textile Colorist 49: p. 89) found that wool dyed with brilliant green was very badly damaged by clothes moth larvae and black carpet beetle larvae.

BRILLIANT YELLOW.

Synonyms: diphenoldiamino-stilbenedisulphonic acid, sodium salt; the sodium salt of disulpho-stilbene-diazo-bi-phenol.

Tests in feeding clothes moth larvae brilliant yellow are described by Mullin (Textile Colorist, 47: p. 229).

BROMCRESOL GREEN.

Synonyms: tetrabromo-m-cresol sulfonphthalein.

Minaeff (Textile Colorist 49: p. 90) has tested the changes in bromocresol green on passing through the alimentary tract of clothes moth larvae. Fabrics treated with bromcresol green were badly damaged by the larvae.

BROMCRESOL PURPLE.

Synonym: dibromo-o-cresol sulfonphthalein.

Minaeff (Textile Colorist 49: p. 90) has tested the changes in bromcresol purple on passing through the alimentary tract of clothes moth larvae. Fabrics treated with bromcresol purple were badly damaged by the larvae.

BROMPHENOL BLUE.

Synonym: tetrabromophenol sulfonphthalein.

Minaeff (Textile Colorist 49: p. 90) has tested the changes in bromphenol blue on passing through the alimentary tract of clothes moth larvae. Fabrics treated with bromphenol blue were badly damaged by the larvae.

BROMTHYMOL BLUE.

Synonym: dibromothymol sulfonphthalein.

Minaeff (Textile Colorist 49: p. 90) has tested the changes in bromthymol blue on passing through the alimentary tract of clothes moth larvae. Fabrics treated with bromthymol blue were badly damaged by the larvae.

BROOM SEEDS.

Seeds of Genista species. German: Ginster seeds.

Schmitz (German Patent 421,100) prepares a mothproofing material by extracting quillai bark and the seeds of lupines and broom with a dilute inorganic acid, sulphuric acid excepted, neutralizing with sodium or magnesium carbonate, evaporating to sirupy consistency and adding sufficient sodium sulphate to make a dry powder.

BRUCINE.

Brucine is one of the alkaloids stated by Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) to have some mothproofing value, but insufficient for practical use.

CAFFEINE.

Synonym: 1,3,7-trimethylxanthine.

Caffeine is one of the alkaloids stated by Minaeff and Wright (Ind. Eng. Chem. 21: 1187, 1929) to have some mothproofing value, but insufficient for practical use. Goods treated with a combination of caffeine with oleic acid were quickly damaged by clothes moth larvae.

CALCIUM ACETATE.

White crystals, soluble in water, slightly soluble in alcohol.

Synonyms: brown acetate, calcii acetas, diacetate of lime, grey acetate, pyrolignite of lime, vinegar salts.

Calcium acetate is mentioned as a salt to be used in a mothproofing solution to form insoluble salts with complex inorganic acids (German Patent 347,723).

CALCIUM CHLORIDE.

White deliquescent crystals, soluble in water and alcohol.

Synonyms: calcii chloridum, chloride of calcium, freezing salts, muriate of calcium, muriate of lime.

Calcium chloride is an ingredient of "Pyromoth." (Back and Cotton, Fur. Warehouseman 8: p. 800). Other constituents are formaldehyde, benzoic acid, ethyl alcohol and water. This solution has offered very good protection from the ravages of fabric pests, but it has discolored some fabrics and has otherwise adversely affected them.

CALCIUM HYDROXIDE.

Synonyms: hydrated lime, slaked lime.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 27) states that air-slaked lime (dusted) is worthless for clothes moth control. Air slaked lime is a mixture of calcium hydroxide and calcium carbonate.

CALCIUM OXIDE.

White lumps, 100cc. water at 0° dissolve 0.13 g. CaO.

Synonyms: burned lime, burnt lime, calcic oxide, calx, calx viva, caustic lime, lime, quicklime, unslaked lime.

Quicklime is one of the constituents in the solution claimed by Conlon (U. S. Patent 387,579) for mothproofing hair.

According to Mullin (Textile Colorist 47: p. 229) dusting garments with lime is ineffective in protecting them against clothes moths.

Lime (air-slaked) (dusted) is ineffective against clothes moth larvae according to Scott, Abbott and Dudley (U.S.D.A.Bull. 707, p. 26).

CAMPHOR.

White translucent masses, soluble in alcohol and ether, insoluble in water.

Synonyms: d-camphor, common camphor, formosa camphor, gum camphor, 2-ketocamphane, laurel camphor, Japan camphor.

Camphor is a well-known clothes moth repellent. Its use for this purpose is mentioned in the following patents: German Patents 258,405; 344,266; 353,682; and 357,063; British Patents 173,536; 230,203 and 19,688 of 1912; U. S. Patents 1,097,406; 1,216,356; 1,562,510; 1,610,167; 1,655,540; and 1,097,406.

Camphor as a moth repellent is also mentioned by Mullin (Textile Colorist 47: p. 163), also by the same author in American Dyestuff Reporter, 14, no. 8, p. 323 (May 18, 1925); Sachs (Textile Colorists 48; p. 527, and American Dyestuff Reporter 14: p. 156); Gershenfeld (Hygeia 3: p. 612); Meckbach (Textilberichte 2: p. 350); Packard (Guide to the Study of Insects, 9th ed. 1889, p. 347); Smith (Our Insect Friends and Enemies, 1909, p. 242); Hecke (Ztschr. ges. Textil- Industrie 28: p. 376, 1925); and Kingzett (Chem. Encyclopedia 4th ed. 1928, p. 471).

Erlenbach (U. S. Patent 1,097,406) proposes a mixture of paradichlorbenzene and camphor for protecting furs and skins from moths.

Sulphur may be melted with camphor and β-naphthol for use against clothes moths (German Patent 411,345).

Benedict (Science, 1917, v. 46, p. 466) states that camphor in closed places kills all stages of clothes moths.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 13) says that camphor may be used in tight chests and trunks for protecting clothing, but it is not as effective as naphthalene or paradichlorobenzene.

An apparatus for vaporizing a camphor-naphthalene mixture for combating clothes moths is described in German Patent 330,492.

Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 21) state that camphor in varying degrees proved effective against the various stages of the clothes moth, but close observations made during the course of the experiments show that it is much less active than the different forms of naphthalene.

CAMPHOR WOOD.

The wood of the Cinnamomum camphora.

Packard (Guide to the Study of Insects, 9th ed. 1889, p. 347) quotes from Harris "****furs and other small articles can be kept by being sewed in bags with bits of camphor wood."

CAPRYLIC ACID.

Synonyms: caprilic acid, otic acid, n-octoic acid, octylic acid.

Caprylic acid is one of the acids specifically mentioned as a carrier for a toxic substance in the mothproofing composition claimed by the Larvex Corporation. (British Patent 236,218; U. S. Patent 1,634,792).

CARBAZOLE.

White crystals soluble in alcohol and ether, insoluble in water.
Synonyms: carbazol, diphenylimide, iminobiphenyl, iminophenyl, karbazol.

Sulphonic and carboxylic acid derivatives of carbazole are claimed for mothproofing purposes in German Patent 344,266.

Carbazole, 6 per cent in acetone, was effective in mothproofing fabric but 3 per cent was ineffective and stained the fabric, forming a deposit on the surface. (Minaeff and Wright, Ind. Eng. Chem. 21: 1187, 1929).

CARBAZOLE, ACETYL.

Needles, slightly soluble in water, soluble in alcohol.
Synonyms: N-acetylcarbazol, N-acetyl carbazole, acetyl dibenzopyrrole, acetyl diphenylenimide.

N-Acetyl carbazole is claimed for mothproofing wool by Bayer and Company (British Patent 238,287) and by the I. G. Farbenindustrie (German Patent 460,545).

CARBAZOLE, ACETYL DICHLORO-.

Needles soluble in chloroform.
Synonyms: acetyldichlorocarbazol, acetyl dichlorodiphenylenimide, acetyldichlorodiphenylimide.

Acetyl dichlorocarbazole is claimed for mothproofing wool in French Patent 581,037, British Patent 238,287 and U. S. Patent 1,562,510.

CARBAZOLE, BENZOYL.

Synonyms: benzoyl diphenylenimide.

Benzoyl carbazole is one of the materials claimed for mothproofing purposes by Bayer and Company (British Patent 238,287).

CARBAZOLE, 3,6-DICHLORO-.

Synonyms: 3,6-dichlorodiphenylenimide;
3,6-dichlorodiphenylimide.

3,6-Dichlorocarbazole is one of the materials claimed for mothproof-

ing by Bayer and Company (British Patent 238,287).

For example, the wool or fur to be treated is steeped in a 1/2 per cent solution of 3,6-dichloro-diphenylimide in alcohol until wetted to the desired degree (which is easily ascertained by repeated working of such goods), whereupon the goods are freed from the solution by well known means and dried.

CARBAZOLE, N-METHYL.

Synonym: N-(9)-Methylcarbazol.

Needles from alcohol. Melting point 87°. Soluble in alcohol.

The I. G. Farbenindustrie (German Patent 460,545) uses N-Methyl carbazole for protecting wool, pelts, etc. against moths.

CARBAZOLESULPHONIC ACID, N-ETHYLCHLORO-.

Several isomers are possible.

Synonym: N-Aethylchlorcarbazol-sulfosaeure.

N-Ethylchloro carbazolesulphonic acid is one of the materials claimed by the I. G. Farbenindustrie (German Patent 460,545), for mothproofing wool, etc.

CARBON DISULPHIDE.

Colorless liquid, soluble in alcohol and ether, slightly soluble in water.

Synonyms: carbon bisulphide, schwefelkohlenstoff, "high-life".

Drushel proposes a mixture of 1 part cedar leaf oil with from 5 to 10 times as much carbon disulphide for fumigating clothing in a tightly closed vault (U. S. Patent 1,630,836).

Carbon disulphide is listed as a clothes moth remedy by Mullin (Textile Colorist 47: p. 1633; and also in American Dyestuff Reporter, 14: no. 8, p. 323 (May 18, 1925).

Back (U.S.D.A. Farmers' Bull. 1353) states that 4 to 6 pounds of carbon disulphide per 1,000 cubic feet of enclosed space should kill all moths and their larvae at temperatures above 65° F.

Tests with carbon disulphide are described by Titschack (Beitrage zu einer Monographie der Kleidermotte, Tineola biselliella Hum, p. 121-131).

CARBON TETRACHLORIDE.

Colorless liquid, soluble in alcohol and ether, very slightly soluble in water.

Synonyms: benzinoform, chlorkohlenstoff, perchloromethan, tetrachloromethane.

The use of carbon tetrachloride in combating clothes moths is mentioned in German Patent 258,405, and by Mullin (Textile Colorist 47: p. 163; also American Dyestuff Reporter, 14: no. 8, p. 323 (May 18, 1925).

Carbon tetrachloride is given as an example of a solvent for hexachloroethane to be used against clothes moths. (German Patent 353,682). Carbon tetrachloride may be used with cedar leaf oil for fumigating clothing in a tightly closed vault (U. S. Patent 1,630,836). Carbon tetrachloride is mentioned as a suitable solvent for cinchona alkaloids for use in mothproofing (U. S. Patent 1,615,843). Carbon tetrachloride is used for the fumigation of upholstered furniture (Back and Cotton, Fur. Warehouseman, 8: p. 800).

Back (U.S.D.A. Farmers' Bulletin 1353, p. 23) says "when the temperature is 70° F or above, good results in killing clothes moths (with carbon tetrachloride) should follow if the quantities given above for carbon disulphide (4 pounds per 1,000 cubic feet) are trebled".

Carbon tetrachloride may be used as a solvent for sulphochlorides (e.g. 1,5-naphthalenedisulphochloride) used for mothproofing (German Patent 449,126).

Phosphoric acid aryl esters may be dissolved in carbon tetrachloride to form a mothproofing solution (U. S. Patent 1,748,675; German Patent 480,180).

CARBONIMIDIC ACID, N-CHLORO ESTERS.

Synonym: chlorimidokohlensaeureester.

Straub (German Patent 419,464) mentions chlorimidokohlensaeureester as having been used as an insecticide against moths. It is also suitable for mothproofing purposes.

CARBOXYLIC ACIDS.

The use of metal salts of various carboxylic acids for mothproofing is mentioned in German Patent 430,186.

Aromatic or heterocyclic compounds with a carboxyl group in the side chain are claimed for mothproofing in German Patent 346,596; and 344,266 claims carboxylic derivatives in any position in aromatic or heterocyclic compounds.

CARBOXYLIC ACIDS, ORTHO-HYDROXY-.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549) claims ortho-hydroxy carboxylic acid, or derivatives thereof, in which the para position to the hydroxyl group is occupied by halogen or sulphur, for protecting material against moth attack.

CASEIN.C.S.C.

Jones (U. S. Patent 1,688,717) mothproofs fabrics by precipitating casein upon them with an aqueous solution of a salt of a rare earth metal.

CASTOR OIL, HYDROGENATED.

The mixed acids or compounds in hydrogenated castor oil are combined with rare earth elements to form mothproofing compositions by Kendall (U. S. Patent 1,739,840; British Patent 247,242).

CASTOR OIL SULPHONATED.

Synonym: turkeyred oil.

The Larvex Corporation (British Patent 301,421; U. S. Patent 1,748,579) uses sulphonated castor oil to facilitate wetting in a moth-proofing solution. For example, 2 parts of thiourea are dissolved in a mixture of 88 parts of water and 12 parts of acetone, to which .3 parts of sulphonated castor oil is added. The fabric is immersed in this solution, excess liquid pressed out and the material is air dried.

CEDAR.

The common red cedar is Juniperus virginia.

Cedar wood dust is one of the constituents of a gypsum wall plaster designed to surface the walls of closets where clothing is stored to repel moths (U. S. Patent 1,620,587).

Cedar chips and shavings are listed by Mullin (Textile Colorist 47: p. 163) as moth preventives; also in American Dyestuff Reporter, 14: no. 8, p. 323, May 18, 1925).

Benedict (Science, 1917, v. 46, p. 466) found that cedar did not repel or harm the clothes moth at any stage.

Packard (Guide to the Study of insects, 9th ed. 1889, p. 347) says furs and other small articles can be kept by being sewed in bags with bits of red cedar or of Spanish cedar.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 27) says that cedar chips and cedar shavings are impractical remedies. "Ordinarily only partially effective, and never effective against adults or the half-grown to full- grown larvae of clothes moths and carpet beetles. They soon lose their value and often become valueless before they are purchased by the retailer."

Red-cedar chips and shavings, while not entirely effective in keeping the adult moths from laying eggs on the flannel treated, appeared to protect it from appreciable injury when used liberally. The chips and shavings showed practically no killing effect against eggs, or against the larvae when over one-fourth grown (Scott, Abbott and Dudley U.S.D.A. Bull. 707, p. 28, 1918).

CEDAR LEAVES.

Synonyms: Juniperus virginiana, red cedar.

Red cedar leaves scattered over the garments are stated by Mullin (Textile Colorist, 47: p. 229) to be ineffective in protecting woolen goods against clothes moths.

Cedar leaf oil mixed with carbon disulphide is claimed by Drushel (U. S. Patent 1,630,836) for fumigating clothing in a tightly closed vault.

Cedar leaf oil is one of the ingredients of a moth-repellent gypsum wall plaster (U. S. Patent 1,620,587).

Back (U.S.D.A. Farmers' Bulletin 1353, p. 27) says that red cedar leaves, dried and placed in clothing, are worthless for clothes moth control.

White, Fulton and Cranor (Ent. News, 40: no. 4, p. 117) state that red cedar leaves are worthless as a mothproofing agent.

CEDAR WOOD OIL.

This oil is distilled from the wood of Juniperus virginiana.

Cedar wood oil may be used mixed with carbon disulphide for fumigating clothing (U. S. Patent 1,630,836).

Oil of cedar wood is mentioned as a well-known moth repellent by Schmitz (U. S. Patent 1,610,167) and by Mullin (Textile Colorist 47: p. 163).

Cedar oil (cedarwood oil) in upholstered furniture is of no value as a protection (Back and Cotton, Fur. Warehouseman, 8: p. 800).

Cedar leaf oil is one of the ingredients of a moth-repellent gypsum wall plaster (U. S. Patent 1,620,587).

CERIUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims a process for mothproofing materials by impregnating them with cerium compounds the acid radical of which is a higher organic acid. The following cerium salts are mentioned: ricinoleate, resinate, sterate, cleate, linoleate, tungate and chloride. For example: Woolen fabrics may be protected from attack by clothes moths, by first saturating the fabric with a hot 1-1/2% solution of sodium stearate, then wringing out and drying, thereafter passing through a warm 1/4% solution of cerium chloride, after which the fabric is passed through warm clear water to remove any excess of the cerium salt.

Timber may be protected from dry rot by painting with the following mixture: Gum dammar 40 parts, cerium tungate 5 parts, turpentine oil 40 parts, and tetrachlorethane 15 parts by weight.

Jackson and Vassell (Ind. Eng. Chem. 19: p. 1177) report cerium oleate to be ineffective for mothproofing.

Jones (U. S. Patent 1,688,717) uses the chloride, acetate or any water soluble salt of cerium to precipitate casein in wool in order to mothproof it. For example, yarn is first treated with a solution of casein (1 part to 40 parts of water) and then with a solution of 1 part of cerium chloride in 40 parts of water. The goods are then wrung out, washed in water to remove excess of metallic salt, and dried.

CHAULMOOGRIC ACID.

Synonym: chaulmoograsaeure.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of chaulmoogric acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

CHLORAL

Condensation products of chloral with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

CHLORINE.

Schabik (German Patent 409,510) soaks gypsum blocks in a volatile disinfectant (for instance chlorine), then in molten naphthalene, and then in paraffin for use against moths.

CHLOROCRESOTINIC ACID ANILIDE SULPHONIC ACID.

Many isomers are possible.

Fabrics and the like are proofed against moths, mould, bacteria, etc., by treatment with a salt of a quaternary phosphonium base applied in a dilute aqueous or other solution. After this treatment the fabric may be treated with another salt interacting with the phosphonium salt to produce less soluble salts. Carboxylic, hydroxycarboxylic, sulphinic or sulphonic acids or inorganic acids such as sulphuric or hydrogen halide acids may be used in forming the salts from the phosphonium base.

In an example material treated with chlorocresotinic acid anilide sulphonic acid is after-treated with a solution of benzyltriphenylphosphonium, sulphate (British Patent 312,163).

CHROMIUM SALTS.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moths by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of chromium, * * * , etc. may be added, and the materials may be used in aqueous solution or in dry-cleaning solvents, such as hydrocarbons, benzene, naphtha, alcohol, and acetone. Other insect repelling substances, such as sodium fluoride or silico-fluoride, may be added. The preparation may be applied during dyeing or other processes.

Bayer and Company (German Patent 347,849 and 347,723) names chromium salts as metallic salts which may be added to a mothproofing solution to form insoluble precipitates with complex inorganic acids but states (British Patent 173,536) that chromium salts alone do not protect material from moths.

Mullin (Textile Colorist 47: p. 162) states that chromium (salts) such as those used in dyeing do not appear seriously to impede clothes moth larvae.

CHRYSOIDINE Y.

Synonym: diamino-azo-benzene-hydrochloride.

Minaeff (Textile Colorist, 49: p. 89) found that wool dyed with chrysoidine Y was very badly damaged by clothes moth larvae and black carpet beetle larvae.

CINCHONA ALKALOIDS.

Cinchona alkaloids or salts or derivatives thereof are claimed by Jackson and Wassell for mothproofing woolen goods in British Patent 263,092; U. S. Patent 1,615,843; French Patent 625,380; Swiss Patent 125,139 and German Patent 485,573.

Cinchona alkaloid solutions are stated by Back and Cotton to be among the better mothproofing solutions tested (Fur. Manufacturer, n.s. 35, p. 36; Furniture Warehouseman, v. 8, p. 800).

A comparison of the cost of cinchona alkaloids and Eulan is made in the Industrial Chemist for November, 1927 (v. 3, no. 34, p. 477). A brief review of the work of Jackson and Wassell with cinchona alkaloids is given in the Pharmaceutical Journal and Pharmacist for November 26, 1927 (v. 119 no. 3343, p. 580-81)

According to Back and Cotton, solutions consisting of cinchona alkaloids dissolved in a light mineral oil of the nature of naphtha are of real value when the fabrics are treated by thorough drenching (Yearbook of Agriculture, 1927, p. 466).

Jackson and Wassell (Ind. Eng. Chem. 19: no. 10, p. 1178) state that of all the chemicals and mixtures studied, only one group of closely related substances has constantly passed all the tests, these substances being the cinchona alkaloids and their derivatives.

Kingzett (Chem. Encyclopedia 4th Ed., 1928, p. 471) refers to the use of cinchona alkaloids as mothproofers.

CINCHONICINE HYDROCHLORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonicine hydrochloride to be effective for mothproofing.

CINCHONICINE OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonicine oleate to be effective for mothproofing.

CINCHONIDINE.

An isomer of cinchonine.

Cinchonidine or salt or derivative thereof are claimed by Jackson and Wassell for mothproofing woolen goods in British Patent 263,092 and U. S. Patent 1,615,843.

Cinchonidine is one of the alkaloids stated by Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929, to have some mothproofing value, but insufficient for practical use. While the free base is of some value, the salts (sulphate, oxalate, salicylate and sulphosalicylate) were absolutely useless as mothproofing agents.

CINCHONIDINE HYDRACHLORIDE.

Large double pyramidal crystals.
1 part water-free salt dissolves at 10° C. in 38.5 parts water.
1 part water-free salt dissolves at 10° C. in 325 parts ether.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonidine hydrochloride to be effective for mothproofing.

CINCHONIDINE HYDROFLUORIDE.

Jackson and Wassell, (Ind. Eng. Chem. 19: p. 1177) report cinchonidine hydrofluoride to be effective for mothproofing.

CINCHONIDINE OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonidine oleate to be effective for mothproofing.

CINCHONIDINE SULFATE.

Long monoclinic prisms, easily soluble in water and alcohol.

Eng.

Jackson and Wassell (Ind/ Chem. 19: p. 1177) report cinchonidine sulfate to be effective for mothproofing.

CINCHONINE.

Cinchonine or salt derivative thereof are claimed by Jackson and Wassell for mothproofing woolen goods in U. S. Patent 1,615,843 and British Patent 263,092.

Cinchonine is one of the alkaloids stated by Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) to have some mothproofing value, but insufficient for practical use. Salts, such as the sulphate, oxalate, salicylate or sulphosalicylate were absolutely useless as mothproofing agents.

CINCHONINE HYDROCHLORIDE.

Monoclinic crystals, soluble in 1 pt. water, and in 1/5 part boiling alcohol.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonine hydrochloride to be effective for mothproofing.

CINCHONINE HYDROFLUORIDE.

Four-sided rhombic columns.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonine hydrofluoride to be effective for mothproofing.

CINCHONINE OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonine oleate to be effective for mothproofing.

CINCHONINE SULFATE.

Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report cinchonine sulfate to be effective for mothproofing.

CITRIC ACID.

Colorless prisms, soluble in alcohol and water.

Synonyms: acidum citricum, oxytricarballylic acid.

Citric acid is an ingredient of mothproofing solutions claimed by the Larvex Corp. in U. S. Patents 1,634,791; 1,634,792 and 1,634,794 and British Patents 235,915 and 236,218.

The preferred composition is .1% sodium oleate; .005% gelatine; 1% sodium fluoride and .004% citric acid (British Patent 236,218).

CLOVES.

The dried flower buds of a tree, Caryophyllus aromaticus, a native of the Moluccas.

According to Mullin (Textile Colorist 47: p. 163; also in American Dyestuff Reporter 14: no. 8, p. 323, May 18, 1925) cloves are a preventive against clothes moths.

Scott, Abbott and Dudley, (U.S.D.A. Bull. 707, p. 26) state that cloves used as a dust proved effective in protecting flannel from moth infestation.

CLUPANODONIC ACID.

Synonym: clupanodonsaeure,

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of clupanodonic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

COCCERIC ACID.

Synonym: cocerinsaeure.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of cocceric acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

COLOCYNTH PULP.

The pulp of the fruit of a Mediterranean plant, Citrullus colocynthus.

Synonyms: bitter apple, bitter cucumber, bitter gourd.

According to Mullin (Textile Colorist 47: p. 229) dusting garments with colocynth pulp is ineffective in protecting them against clothes moths.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 27) says that colocynth pulp (dusted) is worthless for clothes moth control.

According to Scott, Abbott and Dudley, (U.S.D.A. Bull. 707, p. 26) colocynth pulp (dusted) is ineffective against clothes moth larvae.

CONGO RED R.

(Not listed in Green or Schults as such.) This is probably Congo Red R (H); Congo red H; Congo red, or Congo 4R (= Congo red 4R).

Congo red is the sodium salt of diphenyl-diazo-binaphthionic acid.

Minaeff (Textile Colorist 49: p. 89) found that wool dyed with Congo red R was badly damaged by clothes moth larvae and black carpet beetle larvae.

COPPER SALTS.

Salts of copper, according to Mullin (Textile Colorist 47: p. 162) are ineffective for mothproofing purposes. Copper salts of the halogen substituted phenols and cresols are effective for mothproofing fabrics and for protecting marine piling (U. S. Patent 1,085,783).

Copper acetate, copper chloride or other water soluble copper salts are used by Jones to precipitate casein in wool in order to mothproof it (U. S. Patent 1,688,717).

COTTONSEED OIL ACIDS, CHLORINATED.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, titanium and thallium) of chlorinated cottonseed oil acids are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

COTTONSEED OIL, SULPHONATED.

The Larvex Corporation uses sulphonated cottonseed oil as a wetting agent in a mothproofing solution (U. S. Patent 1,634,793).

CREATINE

Monoclinic prisms:
soluble in 74.4 parts water at 18°.
soluble in 94.10 parts cold absolute alcohol.
Synonym: methyl guanidin-acetin-acid.
Jackson and Wassell (Ind. Eng. Chem. 19: p. 1177) report creatine to be ineffective for mothproofing.

CREOSOTE, COAL-TAR.

Yellowish oily liquid, soluble in alcohol, benzene and toluene.

According to Mullin (Textile Colorist 47: p. 163: also in American Dyestuff Reporter, 14: no. 8, p. 323, May 18, 1925) creosote is a recognized clothes moth remedy.

Creosote is used as a solvent for trichloronaphthalene or may be added to a mixture of 1 part burning oil 300°, 1 part paradichlorobenzene and 1 part hexachloronaphthalene used for mothproofing purposes (British Patent 253,993).

CREOSOTE, WOOD TAR.

Creosote of wood tar is one of the constituents of the moth-repellent gypsum wall plaster claimed by Williamson (U. S. Patent 1,620,587).

Wood tar creosote is used by Ruch and Ruch, Jr. (U. S. Patent 369,739) for mothproofing curled hair.

CRESOL.

Commercial cresol is a mixture of ortho- meta- and para-cresols. The boiling points of these compounds are 190.8, 202.8, and 201.1 respectively.

Synonyms: Cresylic acid (ortho- meta- and para-compounds), hydroxy-toluene, methylphenol, oxytoluene.

According to Mullin (Textile Colorist 47: p. 163; also in American Dyestuff Reporter, 14: no. 8, p. 323, May 18, 1925), cresylic acid is a recognized clothes moth remedy.

According to Gershenfeld (Hygeia, 3: p. 642) a kerosene-cresol mixture should be applied to floors infested with carpet beetles.

2-CRESOL-3:5 DISULPHO-BIS-4'-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 2-cresol-3:5 disulpho-bis-4'- chloroanilide is given as an example.

4-CRESOL-3:5-DISULPHO-BIS-4'-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-cresol-3:5-disulpho-bis-4'-chloroanilide.

CRESOL, TETRACHLORO-.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by treating them with a solution of a higher halogenated substitution product of a carbocylic compound, for example, tetrachlorocresol. The fabric is first treated with a solution of the soda or potash salt of tetrachlorocresol and is then treated with a solution of metallic salts, such as lead, zinc, calcium, barium or aluminum, which will yield a precipitate within the pores of the fabric.

4,3-CRESOTIC ACID.

Synonyms: p-cresotic acid, p-cresotinic acid, p-homosalicylic acid, 4-hydroxytoluene-3-carboxylic acid, kresotic acid, p-kresotinsaeure, 5-methylhomosalicylic acid, 1-methylphenol (4)-carboxylic acid, 4-(hydr) oxy-m-toluic acid, p-(hydr) oxytoluic acid, hydroxymethylbenzoic acid.

p-Cresotinic acid is one of the materials claimed for mothproofing by Bayer and Company (German Patent 344,266).

For example, 100 parts by weight of wool are mothproofed by 5 parts p-cresotinic acid, 5 parts sulphuric acid and 15 parts calcined Glauber's salt in solution.

According to French Patent 518,821 wool may be mothproofed by heating 100 parts by weight with 5 parts p-cresotinic acid, 5 parts sulphuric acid and 15 parts Glauber's salt in solution.

CRESOTINIC ACID, CHLORO-.

Several isomers are known.

The I. G. Farbenindustrie (French Patent 636,434 and German Patent 469,256) mothproofs furs by treating them with a dry powder consisting of talc containing 5% chlorocresotinic acid.

CRESOTINIC ACID ANILIDE SULPHONIC ACID, CHLORO.

According to British Patent 312,163, material which has been treated with chloro cresotinic acid anilide sulphonic acid is subsequently treated with a solution of benzyl-triphenylphosphonium sulphate.

CROTONALDEHYDE.

Synonyms: 2-butenal.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report crotonaldehyde to be ineffective for mothproofing.

CUPREINE.

Cupreine, its salts and other derivatives are claimed for mothproofing purposes by Jackson and Wassell. (U. S. Patent 1,615,843).

CYCLOHEXANONE.

Apparently cyclohexanone is in a mothproofing solution put out by Bayer and Company. The solution is soluble in gasoline, carbon tetrachloride, and other dry cleaning solvents. This solution seems to be one of the best obtainable (Back and Cotton, Fur. Warehouseman, 8. p. 800).

Among the better solutions tested are *****and the cyclohexanone solutions (Back and Cotton, Fur. Manufacturer, New Series, 35, p. 36).

According to Back and Cotton (U. S. Yearbook of Agriculture, 1927, p. 466) solutions consisting of cyclohexanone and carbocylic nitrogen derivatives dissolved in such solvents as benzene, gasoline or carbon tetrachloride are of real value when the fabrics are treated by thorough drenching.

DIDYMIUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the higher organic acid salts of didymium for mothproofing. The following salts are specified: ricinoleate, resinate, stearate, oleate, linoleate, and tungate.

DIPHENYLAMINE, ACETYL.

Acetyl Diphenylamine is one of the compounds claimed by the I. G. Farbenindustrie (German Patent 460,545) for mothproofing wool, etc.

DIPHENYLAMINE, ACETYLDICHLOROTHIO.

Acetyldichlorothio diphenylamine is one of the compounds claimed by the I. G. Farbenindustrie (German Patent 460,545) for mothproofing wool, etc.

ELAIDIC ACID.

Synonyms: elaidinsaeure.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of elaidic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

ELATERIN.

White crystalline powder, derived from the juice of Ecballium elaterium, insoluble in water, soluble in ether, slightly soluble in alcohol.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report elaterin to be ineffective for mothproofing.

ETHER, ETHYL.

Jackson and Wassell (U. S. Patent 1,694,219) use ethyl ether as a solvent for quinoidine for mothproofing purposes.

ETHER, METHYL 2-NAPHTHYL.

Synonyms: beta-Naphtyl methyl ether, Nerolin.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report beta-naphthyl methyl ether to be ineffective for mothproofing.

ETHYLENE DIAMINE, N-N'-bis (2, 5 dichlorc) PHENYLSULPHONYL.

Synonym: bis-1:4-dichlorobenzene-2-sulphoethylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R-SO_2-NH-R-SO_2-NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. bis-1:4-Dichlorobenzene-2-sulphoethyldiamide is given as an example.

ETHYLENE DIAMINE, N-N'-bis (2-hydroxy-5-chloro) PHENYLSULPHONYL.

Synonym: bis-4-chloro-1-phenol-2-sulphoethylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-4-chloro-1-phenol-2-sulphoethylenediamide.

EUCALYPTUS LEAVES.

Leaves of Eucalyptus species.

Synonyms: Australian fever tree, blue gum tree, leaves of the gum-wood tree.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 27) says that eucalyptus leaves (dusted) are worthless for clothes moth control.

According to Mullin (Textile Colorist 47, p. 229) eucalyptus leaves dusted over clothing are ineffective in protecting against moths.

According to White, Fulton, and Cranor (Ent. News. 40, p. 117) eucalyptus leaves have no value as a mothproofing agent. Eucalyptus leaves (dusted) are ineffective against clothes moth larvae, according to Scott, Abbott, and Dudley (U.S.D.A. Bull. 707, p. 26).

EUCALYPTUS OIL.

Synonyms: Oleum Eucalypti.

Eucalyptus oil mixed with from 5 to 10 times as much carbon disulphide is claimed by Drushel for fumigating clothing in a tightly closed vault (U. S. Patent 1,630,836).

EULAN.

According to Mullin (Textile Colorist 47, p. 231) Eulan contains fluorine in complex combination. Hecke (Zeitschrift fuer die gesamte Textil-Industrie, 28, p. 376-378; 390-391, 1925) describes mothproofing with Eulan.

Mothproofing with Eulan B dissolved in benzene or alcohol is described by Clark and Craft (J. Soc. Dyers and Colourists, 41, p. 159, 1925).

Eulan BL and Eulan F extra are presumed by Mullin (Textile Colorist 48, p. 90-91) to be the products covered by Bayer and Company in various German Patents.

Eulan F and Eulan "Extra" are described by Clark and Craft (J. Soc. Dyers and Colourists, 41, p. 157, 1925). According to these authors, Eulan is protected by British Patent 173,536, issued to Bayer and Company.

The compositions of these various Eulan preparations are not divulged.

Meckbach (Textilberichte 2, p. 350-351; 373) describes mothproofing with Eulan F.

The Textile World for February 21, 1925 (v. 67, no. 8, p. 55) states that Eulan is a purely inorganic compound. Goods are soaked in a 1° Baumé solution of Eulan.

A water soluble product known as "Eulan Extra"; a "Eulan RHF" which can be used in the dyebath and a benzine-soluble Eulan for the dry cleaner are mentioned in Industrial Chemist for November, 1927 (v. 3, no. 34, p. 477).

Kingsett (Chem. Encyclopedia 4th ed. 1928, p. 471) refers to Eulan as a mothproofer.

Mothproofing with Eulan is discussed in Mullin's paper in the Am. Dyestuff Reporter 14, 321-325, May 18, 1925.

Clark (Textile Mercury v.79 p. 281) describes the mothproofing of fibers with Eulan Extra; Eulan W Extra; Eulan RHF; and Eulan RH. The first two are inorganic, the other two, organic preparations. All of these are stated to give absolute protection against dermestid attack as well as clothes moths.

White, Fulton, and Cranor (Ent. News, 40,1929, p. 117-121; 137-141) state that Eulan A and Eulan F Extra are satisfactory mothproofing materials.

Mention is made by Sachs (The Industrial Chemist, 3, no. 34, p. 504-7) of Eulan W Extra.

Sachs (The Industrial Chemist, 3, no. 34, p. 504-7) states that the effects claimed for Larvex and Eulan are similar, namely, that without any apparent change in the character of the wool fiber it becomes inedible to the moth larvae.

FERROUS SULPHATE.

Greenish crystals, soluble in water, insoluble in alcohol.

Synonyms: copperas, ferri sulfas, ferrum vitriolatum, green vitriol, iron sulfate, iron vitriol, protosulfate of iron, sal chalybdis, salts of steel, vitriolate of iron. An impure solution of ferrous sulphate is called pickling liquor.

According to Mullin (Textile Colorist, 47, p. 163; also in American Dyestuff Reporter 14, no. 8, p. 323, May 18, 1925) ferrous sulphate solution is both a preventive and a remedy against clothes moths.

FLUOBORACETIC ACID.

Synonym: borofluoroacetic acid; acide borofluoroacetique.

The I. G. Farbenindustrie uses this acid, or its salts, for mothproofing. For example, 100 kg. of wool are treated with 2 per cent potassium borofluoroacetate (French Patent 661,931).

FLUOBORCHLOROACETIC ACID.

Synonym: borofluorochloroacetic acid; acide borofluorochloracetique.

This acid is used by the I. G. Farbenindustrie (French Patent 661,931) for mothproofing wool.

FLUOBORFORMIC ACID.

Synonym: borofluoroformic acid; acide borofluoroformique.

This acid is used by the I. G. Farbenindustrie (French Patent 661,931) for mothproofing wool.

FLUOBORHYDRIC ACID.

Synonyms: Borofluorhydric acid, Borohydrofluoric acid and Fluoboric acid.

Decomposed by water very rapidly.

This acid and its salts are claimed by Bayer and Company (United States Patent 1,682,975) for mothproofing purposes.

FLUORIDES.

White crystalline powders, Solubilities:

Sodium fluoride - 4.05 g / 100 cc. at 25° C.
Potassium fluoride - 92.3 g 100 cc. at 18° C.
Lithrium fluoride - 0.151 g 100 " " 25° C.
Zinc fluoride tetra hydrate - 1.516 g. 100 cc. at 25° C.
Aluminum fluoride - 0.559 g. 100 cc. at 25° C.

The Larvex Corporation (British Patent 236,218) states that any fluoride compound may be employed as the toxic agent in mothproofing woolen goods.

Bayer and Company (German Patent 347,849) claims the salts or double salts of hydrofluoric acid for mothproofing.

Soluble fluorides, more particularly the fluorides of sodium, potassium, lithium, zinc, and aluminum, are claimed by the Larvex Corporation (U. S. Patents 1,634,790, 1,634,791 and 1,634,792 and British Patents 235,914 and 235,915).

Among the better mothproofing solutions tested by Back and Cotton (Fur. Manufacturer, n. s. 35, p. 36) are the fluoride solutions.

Back and Cotton (Fur. Warehouseman, 8, p. 800) tested 3 fluoride mothproofing solutions. The product of Bayer and Company contains ammonium fluoride, ammonium sulphate, aluminum sulphate, zinc and aluminum oxides and a small amount of unidentified organic material. When fabrics are thoroughly saturated with this solution, considerable protection is given, but the immunity afforded is not equal to that of the cyclohexanon, the cinchona alkaloid solution, or the fluoride solution No. 3. Another solution contains .29 per cent fluosilicic acid, 54 per cent sodium fluosilicate, and .5 per cent calcium fluoride. This solution has proved to be uniformly excellent when clothes have been well sprayed and immersed in it. (See also U. S. Yearbook of Agriculture, 1927, p. 466).

Wood flour treated with fluorides is rolled in a drum with furs in order to render them resistant to mites (I. G. Farbenindustrie, French Patent 636,434).

Menzies (U. S. Patent 1,732,240) uses a solution of a soluble fluoride and a bile salt for mothproofing.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1175-80) state that most of the hydrofluorides and bitter substances proved ineffective mothproofing agents.

FLUOSILICATES.

White crystalline powders, Solubilities:
Sodium fluosilicate - 1 part in 153 parts water at 17.5°.
Potassium fluosilicate - 1 part in 833 parts water at 17.5°.
Lithium fluosilicate dihydrate - 53 parts in 100 parts cold water.
Zinc fluosilicate hexahydrate - soluble.
Aluminum fluosilicate - 4.0 g/100 cc. at 15° C.
Synonyms: silicofluorides.

Soluble fluosilicates, particularly those of sodium, potassium, lithium, zinc, and aluminum, are claimed as ingredients of a mothproofing composition by the Larvex Corporation (U. S. Patents 1,634,790, 1,634,791 and 1,634,794; and British Patents 235,914 and 235,915).

FLUOSTANNIC ACID.

Synonym: Stannic hydrofluoric acid.

Known only in the form of its salts; for example ammonium fluostannate. This acid and its salts are claimed for mothproofing purposes by Bayer and Company (United States Patent 1,682,975).

FLUOSULPHONIC ACID.

Free fluosulphonic acid or its salts are used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials. Suitable salts are those of lithium, potassium, sodium, ammonium, zinc, aniline, pyridine, quinoline, betaine, and hexamethylenetetramine.

FLUOTITANIC ACID.

Known only in the form of salts.

Synonyms: Titanium hydrofluoric acid.

This acid and its salts are claimed by Bayer and Company (British Patent 173,536; German Patent 347,849; and U. S. Patent, 1,682,975) for mothproofing wool. For example: 100 parts of wool are placed over night in a bath (3000 parts of water) containing one part of titanium hydrofluoric acid, two parts of sulphate of zinc, 20 parts of Glauber's salt and three parts of formic acid. The wool is then rinsed and dried.

FLUOXYMOLYBDIC ACID.

Synonyms: Fluomolybdic acid; molybdic hydrofluoric acid.

Three fluoxymolybdic acids are known in the form of their salts only; for example: fluoxyhypomolybdic acid, ammonium salt, $2NH_4F.MoOF_3$ fluoxymolybdic acid, ammonium salt $NH_4F.MoO_2F_2$, fluoxypermolybdic acid, ammonium salt $3NH_4F.MoO_3F_2$. The salts are claimed for mothproofing purposes by Bayer and Company (United States Patent No. 1,682,975).

FORMALDEHYDE.

The aqueous solution is formalin. Miscible with water and alcohol.
Synonyms: formalin, formalith, formic aldehyde, formol, oxymethylene.

A solution of formaldehyde in kerosene or turpentine at the rate of 20 grams per liter is claimed in British Patent 221,599, for preserving timber, furniture, and leather from attack by animal and vegetable pests.

"Pyromoth", containing formaldehyde as one of its constituents, has offered very good protection from the ravages of fabric pests (Back and Cotton, Fur. Warehouseman, 8, p. 800).

Formaldehyde vapor is ineffective against clothes moths (Smith, Our Insect Friends and Enemies, 1909, p. 241).

Formaldehyde is stated by Mullin (Textile Colorist, 47, p. 229) to be worthless against clothes moths when applied as a 10 to 1 spray.

The use of gypsum blocks soaked in formalin then in naphthalene or paradichlorobenzene and finally in paraffin against moths is described in German Patent 409,510.

Formaldehyde sprayed 1 to 10 is worthless for clothes moth control (Back, U.S.D.A. Farmers' Bulletin 1353, p. 27) and formaldehyde fumigation is worthless for control of clothes moths or other fabric pests, notwithstanding general belief (ibid, p. 20).

Wildt (German Patent 272,822) protects materials against insects by treating with formaldehyde solution followed by an aqueous solution of ammonia. This forms hexamethylenetetramine in the impregnated material.

Clark (Soc. Dyers & Colourists v. 44, p. 144) states that wool treated with formaldehyde does not resist the attack of moth grubs in the slightest.

Gassner (Chem. Tech. Fabrikant v. 55, p. 42) states that formaldehyde vapor does not kill insects.

Lawrie (J. Soc. Dyers & Colourists 39, p. 243, 1923) states that skins treated for several hours in a dilute solution of formaldehyde are to a certain extent immune from the attack of vermin and moths.

Trotman, Trotman, and Brown (J. Soc. Dyers and Colourists, 44, no. 2, p. 49-52, 1929) state that formaldehyde gives marked protection against the action of bacteria and remark that the treatment would probably also give immunity against attack by moths.

According to Scott, Abbott and J. E. Dudley (U.S.D.A. Bulletin 707, p. 26) formaldehyde killed the eggs of clothes moths when used undiluted and when diluted with 5 parts of water, but when used at the rate of 1 part to 10 parts of water eggs were not killed. They also state that formaldehyde in solution and in crystalline form (paraformaldehyde) failed to kill a majority of the adults and was of no value against larvae.

Condensation products of formaldehyde with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

FORMIC ACID.

Boiling point 100.5°.
Synonyms: acid hydrogen carboxylic, acidum formicum.

Formic acid is an ingredient of mothproofing solutions claimed in German Patents 346,597, 347,722, and 347,849; British Patent 173,536; and

United States Patents 1,494,085, 1,634,791, and 1,682,975. For example; 100 parts of wool are placed over night in a bath containing 1 part titanium hydrofluoric acid, 2 parts sulphate of zinc, 10 parts Glauber's salt, and 3 parts formic acid. The wool is then rinsed and dried (German Patent 347,849).

A small proportion of formic acid may be used in a solution of soluble fluorides and fluosilicates for mothproofing (British Patent 235,915).

Formic acid is used with Eulan F for mothproofing wool (Meckbach Textilberichte 2, p. 373, 1921).

FUCHSINE.

A dyestuff. It consists of a mixture of the hydrochlorides or acetates of pararosanilin (triamino-triphenyl-carbinol) and rosaniline (triamino diphenyl-tolyl-carbinol).

Synonyms: amethyst, aniline red, azalein, cerise, chestnut, erythrobenzine, fuchsiacine, fuchsianite, garnet, geranium, grenaldine, harmaline, magenta, magenta crystals, magenta red, magenta roseine, maroon, ponceau, roseine, rubeanite, rubesine, rubianin, rubine, Russian red, salferino.

Minaeff (Textile Colorist, 49, p. 89) found that wool dyed with fuchsine was badly damaged by clothes moth larvae and black carpet beetle larvae.

"G" SALT.

Synonyms: sodium salt of 7-8 disulfonic beta-naphthol.

Jackson and Vassell (Ind. Eng. Chem. 19, p. 1177) report "G" salt to be ineffective for mothproofing.

GASOLINE

Synonyms: motor spirit, petrol.

According to Benedict (Science, 1917, v. 64, p. 466), gasoline fumes are ineffective against clothes moths.

According to Mullin (Textile Colorist 47, p. 163), gasoline is an effective remedy against clothes moths.

Smith (Our Insect Friends and Enemies, 1909, pp. 241, 242) states that when a fabric is once infested and the insects can not be reached by beating or brushing, a drenching with gasoline is effective. Gasoline will kill every caterpillar that it touches and is the best material to use where rugs, carpets, hangings, or draperies that can not for any reason be removed, are dealt with.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 14) recommends treatment of cracks and hiding places with gasoline, benzine and kerosene. Back (ibid, p. 28) also says "Gasoline sprayed on flannel killed clothes moth eggs. Dipping clothing in gasoline will kill clothes moths, and articles so dipped and coming direct from the dry-cleaning process may be considered freed, temporarily at least, from moth infestation."

Gasoline is mentioned by Jackson and Vassell (Ind. Eng. Chem. 19, p. 1175-1180, 1927) as a moth-repellent.

Scott, Abbott and Dudley, (U.S.D.A. Bull. 707, p. 24) state that gasoline sprayed on pieces of flannel infested with larvae killed all larvae.

GELATINE.

Gelatine is one of the ingredients of the mothproofing compositions claimed by The Larvex Corporation in British Patent 236,218 and U. S. Patent 1,634,792 and 1,634,793. The gelatine acts as a wetting agent and enables the mothproofing composition to more readily and thoroughly penetrate the materials. The preferred composition is .1% sodium oleate; .005% gelatine; 1% sodium fluoride and .004% citric acid (British Patent 236,218).

GLUE.

Glue is an ingredient of the following solution used to mothproof hair felt by Stagner (U. S. Patent 1,558,122); water, 10 gallons; soda ash crystals, 43 pounds; white arsenic, 10 pounds; glue 1 pound; soap, 1/4 to 1/2 pound.

GUANIDINE, ALPHA-GAMMA DIPHENYL.

Synonyms: melanilin.

Jackson and Vassell (Ind. Eng. Chem. 19, p. 1177) report diphenylguanidine to be ineffective for mothproofing.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) found 1 per cent diphenylguanidine in acetone to have mothproofing value, but it made the fabric very stiff.

GUANIDINE, ALPHA, GAMMA-DITOLYL.

Jackson and Vassell (Ind. Eng. Chem. 19, p. 1177) report ditolylguanidine to be ineffective for mothproofing.

GUANIDINE, TRIPHENYL.

Triphenylguanidine is claimed for mothproofing purposes by Bayer and Company (U. S. Patent 1,562,510; British Patent 238,287; French Patent 581,037; and German Patent 402,341).

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) found triphenylguanidine up to 2 per cent in acetone to have little mothproofing value; moreover, it rendered the fabric so stiff that it was unusable.

GUM ACID.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of gum acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

HELLEBORE (WHITE)

The powdered root of Veratrum Album.

According to Mullin (Textile Colorist, 47, p. 229), dusting garments with white hellebore does not protect them against clothes moths.

Back (U.S.D.A. Farmers' Bulletin 1353, p. 27) states that white hellebore (dusted) is worthless for the control of clothes moths.

Hellebore, white (dusted) proved ineffective against clothes moth larvae according to Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 26).

HEXACHLOROETHANE.

Colorless crystals of a camphorlike odor, soluble in alcohol and ether, insoluble in water.

Synonyms: carbon hexachloride, carbon trichloride, perchloraethan, perchloroethane, tetrachloroethylene dichloride.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report hexachloroethane to be ineffective for mothproofing.

Hexachloroethane is claimed in German Patent 353,682 for protecting wool, etc., from moths. It may be used undiluted or in admixture or in solution with indifferent or insecticidal materials, for example, in solution in acetone or carbon tetrachloride.

Gassner (Chem. Tech. Fabrikant v. 55, p. 42, 1928) calls attention to the tests of Hase with hexachloroethane against clothes moths. A dosage of 1 to 1.5 kg. per cubic meter of space is recommended.

HEXAMETHYLENETETRAMINE.

Synonym: formin.

Wildt (German Patent 272,822) forms this in materials to protect them against insects by the action of ammonia on formaldehyde.

HEXAMETHYLENETETRAMINE FLUOSULPHONATE.

Hexamethylenetetramine fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

HYDRAZINE HYDROFLUORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report hydrazine hydrofluoride to be ineffective for mothproofing.

HYDRAZINE SULFATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report hydrazine sulfate, as well as the following combinations to be ineffective for mothproofing: Hydrazine sulfate in water, followed by ammonium fluoride in water; hydrazine sulfate, ammonium fluoride, and dry-cleaning soap in naphtha; hydrazine sulfate, magnesium sulfate, and ammonium fluoride in water.

HYDROCARBON OILS.

(See benzine, gasoline, kerosene, etc.)

According to Mullin (Textile Colorist, 47, p. 163), hydrocarbon oils are an effective remedy against clothes moths.

A hydrocarbon oil is used to dissolve bromo or chloronaphthalene for mothproofing fabrics (British Patent 261,241).

The Graesser-Monsanto Chemical Works, Ltd. (British Patent 253,993) insect-proofs timber with a mixture of 1 part of the paraffin hydrocarbon sold as burning oil 300°; 1 part paradichlorobenzene and 1 part of hexachloronaphthalene.

HYDROFLUORIC ACID.

Solubility, 264 g. in 100 cc. water at 15°

This is one of the materials claimed by Bayer and Company (British Patent 173,536; German Patents 347,722 and 347,849; U. S. Patent 1,682,975; and French Patent 518,821) for mothproofing wool. For example, 100 parts

of wool are boiled for one hour in a bath (5,000 parts water) consisting of 2 parts hydrofluoric acid, 10 parts Glauber's salt, and 3 parts concentrated sulphuric acid. The wool is then rinsed and well dried (U. S. Patent 1,682, 975).

The I. G. Farbenindustrie (British Patent 295,742) mothproofs 100 kg. of material in 10 times the quantity of hot or cold water with 2 kg. of the addition product from the sodium salt of paratoluenesulphonic acid and 2HF.

Hydrofluoric acid, in combination with Glauber's salt and sulfuric acid in water, is mentioned by Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177, 1927) as being an ineffective mothproofing agent.

HYDROFLUOSILICIC ACID.

Colorless fuming liquid, soluble in water. Aqueous solution can be concentrated to about 60 per cent.

Synonyms: hydrofluosilicic acid, hydrogen silicofluoride, hydrosilicofluoric acid, kieselfluorwasserstoffsaeure, sand acid, silicofluoric acid.

This is one of the materials claimed by Bayer and Company (British Patent 173,536; German Patent 347,849; French Patent 518,821; and U. S. Patent 1,682,975) for mothproofing wool.

Bayer and Company (German Patent 346,598) uses hydrofluosilicic acid for mothproofing in place of the sulphonic and carboxylic acids claimed in German Patent 344,266. For example: (German Patent 346,598), one kilogram of wool is boiled one-half hour with 200 cc. of a 10 per cent solution of hydrofluosilicic acid, 20 grams sulphuric acid and 100 grams Glauber's Salt.

HYDROQUINOL.

Crystals, 100 parts water at 15° C. dissolve 5.85 grams hydroquinone.

Synonyms: para-dioxybenzene, p-diosybenzol, hydroquinone.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report hydroquinone to be ineffective for mothproofing.

HYDROSULPHITE.

The usual hydrosulphite is sodium hydrosulphite, a yellowish white powder, soluble in water, and insoluble in alcohol.

According to Mullin (Textile Colorist, 48, p. 91) wool shoddy which has recently been stripped by means of hydrosulphite does not appear to be as susceptible to moth damage as virgin wool.

INDIGO.

Synonym: Indigo pure (BASF), indigotin.

Minaeff (Textile Colorist, 49, p. 89) found that wool dyed with indigo was badly damaged by clothes moth larvae and black carpet beetle larvae.

JAPANIC ACID.

Synonyms: nonadecamethylene-dicarboxylic acid, Japansaeure.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of japanic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

KEROSENE.

Kerosene is a mixture of paraffin hydrocarbons, b.p. 150° to 300°.

Synonyms: astral oil, coal oil, paraffin oil.

According to Mullin (Textile Colorist, 47, p. 163, also American Dyestuff Reporter, 14, p. 323, 1925) kerosene is an effective remedy against clothes moths.

According to Benedict (Science 1917, p. 466), the fumes of kerosene are ineffective against clothes moths.

Kerosene is one of the solvents used by Jackson and Wassell (U. S. Patents 1,615,843 and 1,694,219) to dissolve cinchona alkaloids for mothproofing purposes.

Gershenfeld (Hygeia 3, p. 642) recommends the use of kerosene or kerosene-cresol on floors to combat carpet beetles. Back (U.S.D.A. Farmers' Bull. 1353, p. 14) recommends treating cracks and hiding places with kerosene for the killing of fabric pests.

Formaldehyde in kerosene is employed by Berkeley and Stenhouse (British Patent 221,599) for protecting leather, etc. from insect attack.

Scott, Abbott, and Dudley (U.S.D.A. Bull. 707, p. 23) state kerosene and various oils of the nature of kerosene have proved very effective in preventing infestation of larvae. It is necessary to use such emulsions either undiluted or only slightly diluted if satisfactory control is to be expected.

LANTHANUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) clairs the higher fatty acid salts of lanthanum for mothproofing. The following lanthanum salts are mentioned specifically; ricinoleate, resinate, stearate, oleate, linoleate, and tungate. For example: Woolen fabrics may be protected from attacks by clothes moths, by impregnating the fabric with a 1.% solution of lanthanum stearate in benzol.

Jackson and Wassell (Ind. Eng. Chem., 19, p. 1177) report lanthanum oleate to be ineffective for mothproofing.

Water soluble salts of lanthanum, such as the acetate or chloride are employed by Jones (U. S. Patent 1,688,717) to precipitate casein in woolens for mothproofing purposes.

LARVEX.

Mothproofing tests with Larvex are described by Sachs (Textile Colorist 46, pp. 225-226).

Sachs (Textile Colorist, 47, p. 783) describes later mothproofing tests with Larvex as follows: "Some black carpet beetle larvae were placed in two petri dishes on two pieces of woolen fabric, one of which was treated with Larvex in the usual manner, the other being left untreated. The larvae were very active. The untreated cloth was damaged very seriously. At the end of a week the untreated cloth was eaten through by large holes, and a very large quantity of excretum was present. The Larvexed fabric was absolutely untouched, but the larvae were still alive and vigorous so that it was necessary to take a snapshot of 1/50 second to photograph them. The two samples present a remarkable contrast, and they bring out clearly the fact that Larvex is not an insecticide, but merely renders the fabric inedible to the injurious larvae".

Haven (Report of Tests Upon the Immersion of Fabrics in Larvex Solution, MS., Textile Lab. Mass. Inst. Tech., Cambridge, Mass., April 28, 1926) has reported that a 1 per cent aqueous solution of Larvex does not change the tensile strength or the elastic properties of fabrics or cause them to deteriorate.

White, Fulton and Cranor (Ent. News, 40, 1929, pp. 117-121) state that material thoroughly saturated with Larvex solution will be repellent to moth larvae to such an extent that they will refuse it as food.

Sachs (Industrial Chemist, 3, p. 504-507) mentions Larvex as a very effective mothproofing agent.

LAVENDER FLOWERS

Flowers of Lavendula Vera, a European mint.

Back (U.S.D.A. Farmers' Bull. 1353, p. 27) says that lavender flowers (scattered on) are worthless for the control of clothes moths.

Mullin (Textile Colorist 47, p. 229) states that lavender flowers spread over garments are ineffective in protecting them against clothes moths.

Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 26) state that lavender flowers are of no value in preventing moth infestation.

LAVENDER OIL.

Synonyms: Lavender flower oil, oleum lavandulae florum.

According to Mullin (Textile Colorist, 47, p. 163; also in American Dyestuff Reporter 14, p. 323) oil of lavender (but not the flowers) is a clothes moth preventive.

According to Sachs (Textile Colorist, 48, p. 527), lavender oil tends to drive off the adult moths.

Scott, Abbott and Dudley (U.S.D.A. Bull 707, p. 26) state that oil of lavender proved effective in protecting flannel from moth infestation.

LEAD, WATER SOLUBLE SALTS OF.

100 grams water dissolve 55.04 grams lead acetate at 25°C. or 1.08 grams lead chloride. Jones (U. S. Patent 1,688,717) uses water soluble salts of lead, more specifically the chloride or acetate, to precipitate casein in fabrics for mothproofing purposes.

LEAD CARBONATE.

Synonyms: Ceruse, cerussite (native), flake lead, lead spar, plumbic carbonate, plumbicarbonas, white lead.

Back (US.D.A. Farmers' Bull. 1353, p. 27) says that lead carbonate dusted is worthless for clothes moth control.

Mullin (Textile Colorist 47, p. 229) states that lead carbonate dusted over garments is ineffective in protecting them against clothes moths.

Lead carbonate (dusted) proved ineffective against clothes moth larvae, according to Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 26).

LEAD OXIDE.

Lead oxide may be PbO, PbO_2, or Pb_3O_4.

Back (U.S.D.A. Farmers' Bull. 1353, p. 27) says that lead oxide (dusted) is worthless for clothes moth control.

Mullin (Textile Colorist 47, p, 229) states that lead oxide dusted over garments is ineffective in protecting them against clothes moths.

Lead oxide (dusted) proved ineffective against clothes moth larvae according to Scott, Abbott and Dudley (US.D.A. Bull. 707, p. 26).

LEATHER.

Packard (Guide to the Study of Insects, 9th ed., 1889, p. 347) quotes from Harris "***shavings of Russian leather should be placed among the clothes when they are laid aside for the summer."

LINOLEIC ACID.

Synonyms: hanfolsaeure, leinclsaeure, linolsaeure.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of linoleic acid are claimed for moth-proofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

LINOLENIC ACID.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of linolenic acid are claimed for moth-proofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

LINSEED OIL, SULPHONATED.

The Larvex Corporation claims a solution containing sulphonated linseed oil as a wetting ingredient for mothproofing purposes (U. S. Patent 1,634,793).

LITHIUM FLUORIDE.

Solubility - 0.151 g. / 100 cc. at 25°C. White powder.

Lithium fluoride may be one of the ingredients of the mothproofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790); and by Minaeff (U. S. Patent 1,634,791).

LITHIUM FLUOSILICATE.

White powder, solubility - 53 parts in 100 parts water at 17°C.

Lithium fluosilicate may be one of the ingredients of the moth-proofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790).

LITHIUM FLUOSULPHONATE.

Lithium fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

LUPINUS SEEDS.

Schmitz (British Patent 230,203; German Patent 421,100; U. S. Patent 1,610,167) protects wool by saturating it in a 1 to 2 per cent solution of an insecticide made by extracting saponins from quillai bark and alkaloids from lupinus seeds.

The alkaloidal extract may be prepared from different kinds of lupinus, such as: Lupinus albus, L. niger, L. luteus, L. angustifolius, and L. perennis.

MAGNESIUM OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report that magnesium oleate is an ineffective mothproofing agent.

MAGNESIUM SULPHATE.

Epsom salt, $MgSO_4.7H_2O$, is a white crystalline material, very soluble in water. One hundred parts water at 20° dissolve 116.54 parts Epsom salt.

Synonyms: Bitter salt, Epsom salts, hair bitter, kieserite (native) Magnesia vitriolata, magnesii sulpas, sal catharticum, amar, salts.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report magnesium sulphate and also magnesium sulfate in water, followed by ammonium fluoride in water, and likewise magnesium sulfate, followed by sodium fluoride in water to be ineffective for mothproofing.

Back and Cotton (Furniture Warehouseman 8, p. 800) state "A rumor has been persistent during the past several years that Epsom salts will protect against clothes moths. Fabrics saturated with strong water solutions of Epsom salts or fabrics upon which Epsom salt crystals have been scattered, have been fed upon by fabric pests".

Gershenfeld (Hygeia 3, p. 642) writes as follows: "Dr. Paul Mitchell in an article published in Health, an Australian publication, says that crystals of Epsom salt are preferable to naphthalene for protection against moths, roaches, ants, and other commonly observed pests if used in trunks and closed places. I have experimented with Epsom salt in suitcases, cupboards, and chests. In its crystalline form it protects against many household pests. The chemical should not be used in powder form. If Epsom salt in crystalline form is exposed to the air it loses moisture and turns to a powder, or it absorbs moisture, melts, and becomes a liquid. Being most effective when crystalline, it should not be used in open spaces. Employed in closed places, Epsom salts in crystalline form possess a greater efficiency than naphthalene or pyrethrum powder and does not possess an objectionable odor".

The Pharmaceutical Journal and Pharmacist for November 26, 1927 (119, p. 581) refers to the reported successful use of magnesium sulphate as a moth repellent.

Back and Cotton (U. S. Yearbook of Agriculture, 1927, p. 466) state that solutions of Epsom salts in water are of no value in spite of many newspaper reports of their efficacy.

MANGANESE DIOXIDE.

Insoluble.

Synonyms: Binoxide of manganese, black oxide of manganese, manganidioxidum, mangani oxidum nigrum, manganic dioxide, manganesii peroxidum, peroxide of manganese, psilomelane, pyrolusite (native).

This is one of the constituents of a solution used by Conlon (U. S. Patent 387,579) for mothproofing hair.

MERCURIC CHLORIDE.

White crystals, soluble in water, alcohol and ether.

Synonyms: Corrosive, corrosive chloride of mercury, corrosive sublimate, dimuriate of mercury, hydrargyri chloridum corrosivum, hydrargyri corrosivum sublimatus, hydrargyri muriaticum corrosivum, hydrargyri perchloridum, hydrargyri permurias, hydrargyri supermurias, mercury bichloride, mercury chloride, perchloride of mercury.

According to Benedict (Science 46, p. 466) larvae (Tineola bisselliella) placed in Petri dishes with a piece of cloth soaked in corrosive sublimate ate of the cloth as shown by the color of their alimentary canal and the feces, but lived on for weeks apparently uninjured.

Mullin (Textile Colorist 47, p. 163; also American Dyestuff Reporter 14, p. 323) states that mercuric chloride in alcoholic solution is both preventive and remedial against clothes moths.

Packard (Guide to the Study of Insects, 9th Ed., 1889, p. 347) quotes Dr. Harris as saying "the cloth lining of carriages can be secured forever from the attacks of moths by being washed or sponged on both sides with a solution of the corrosive sublimate of mercury in alcohol, made just strong enough not to leave a white stain on a black feather."

MERCURY, WATER SOLUBLE SALTS OF.

100 g. of water at 10° dissolve .75 gram mercurous acetate; at 13°, 25 grams mercuric acetate; and at 20°, 7.39 grams mercuric chloride. Jones (U. S. Patent 1,688,717) precipitates casein in fabrics for mothproofing purposes with water soluble salts of mercury, such as the acetate or chloride.

METALDEHYDE.

Needles or tetragonal prisms. Insoluble in water, slightly soluble in alcohol. 100cc. calcium chloride dissolve 1.034 gr. at 26° C.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report metaldehyde to be ineffective for mothproofing.

METHANE, DIPHENYL.

Long colorless needles, soluble in alcohol and ether, insoluble in water.

Synonyms: benzylbenzene, benzylbenzol, phenylmethanphenyl.

The sulphonic and carboxylic acid derivatives of diphenylmethane are claimed for mothproofing purposes in German Patent 344,266.

METHYL ORANGE.

Synonyms: dimethyl aniline orange, gold orange, helianthin, mandarin orange, orange III, Porrier's orange III, sodium salt of sulpho-benzene-azo-dimethyl aniline, tropaeoline D. (Trapaeoline)

Minaeff (Textile Colorist 49, p. 90) has tested the changes in methyl orange on passing through the alimentary tract of clothes moth larvae. Fabrics treated with methyl orange were badly damaged by the larvae.

METHYL VIOLET CRYSTALS.

This is probably crystal violet (crystal violet 5 BO (1); crystal violet O; violet C; and violet 7B Extra).

Synonyms: Hydrochloride of hexamethyl-p-rosanilines.

Wool dyed with methyl violet crystals was found to offer considerable resistance to clothes moth larvae and to black carpet beetle larvae, although by no means can it be called mothproof. (Minaeff, Textile Colorist 49, p. 89).

METHYL VIOLET R. CONCENTRATED POWDER.

(Not listed in Green or Schultz).

This is perhaps similar to: benzyl violet; Paris violet 6 B; methyl violet 6 B; and methyl violet 6B Extra; methyl violet 5B; violet 5 B; violet 6 B.

Composition is chiefly a mixture of the hydrochlorides of benzyl pentamethyl-p-rosaniline, and hexamethyl-p-rosaniline.

Wool dyed with methyl violet R was found to offer considerable resistance to clothes moth larvae and to black carpet beetle larvae, although by no means can it be called mothproof. (Minaeff, Textile Colorist 49, p. 90).

METHYLENE BLUE.

Synonym: methylo-chloride of trimethyl amino-imino-imino-diphenyl-sulphide.

Minaeff (Textile Colorist 49, p. 89) found that woolen dyed with methylene blue was badly damaged by clothes moth larvae and black carpet beetle larvae.

MOLYBDIC ACID.

White powder, slightly soluble in water.

Synonym: molybdaensaure. Molybdic anhydride, MoO_3, is also called molybdic acid.

Bayer and Company (British Patent 173,536; German Patent 347,721; French Patent 518,821) claims this material for mothproofing wool, furs, skins, hair and the like.

MONOPOTASSIUM MONOFLUOROPHOSPHATE.

Soluble in a 40% aqueous solution of hydrofluoric acid.

Synonym: Monopotassium monofluorophosphate.

The I. G. Farbenindustrie (British Patent 295,742) mothproofs woolens as follows: 100 kg. of the material in 10 times the quantity of hot or cold water are treated with 2 kg. monopotassium monofluorophosphate, with or without the addition of organic or inorganic acids and salts, subsequently rinsed and dried in the customary manner.

NAPHTHA.

A special heavy petroleum naphtha is the preferred solvent used by Jackson and Wassell (U. S. Patent 1,615,843; French Patent 625,380; Swiss Patent 125,139) for dissolving cinchona alkaloids for mothproofing purposes.

Petroleum naphtha is also listed by them (U. S. Patent 1,694,219) as a suitable dry solvent for dissolving quinoidine in combination with fatty acids.

Naphtha (Jackson and Wassell, Ind. Eng. Chem. 19, p. 1175) is mentioned as a moth repellent.

NAPHTHALENE.

White crystalline volatile flakes, soluble in alcohol and ether, insoluble in water.

Synonyms: moth camphor, naphtalin, naphthalin, tar camphor, white tar, camphor balls.

Benedict (Science 46, p. 466) states that naphthalene in closed

places kills all stages of clothes moths.

The use of naphthalene as a clothes moth repellent is well known and is referred to in the following patents: German Patents 258,405; 344,266; 353,682; 357,063; British Patents 19,688 of 1912; 173,536; 230,203; and U. S. Patents 1,097,406; 1,216,356; 1,562,510; 1,610,167; 1,634,002; and 1,655,540.

Naphthalene as a moth preventive or repellent is also mentioned by Sachs (Textile Colorist 48, p. 527; Industrial Chemist 3, p. 504); Mullin (Textile Colorist 47, p. 163; American Dyestuff Reporter 14, p. 323, 1925); Clark and Craft (J. Soc. Dyers and Colourists 41, p. 155); Sachs (American Dyestuff Reporter 14, p. 156; and Textile Colorist 46, p. 221; also in Industrial Chemist 3, p. 505); Gershenfeld (Hygeia 3, p. 642); Meckbach (Textilberichte 2, p. 350); Smith (Our Insect Friends and Enemies, 1909, p. 242); Hecke (Ztschr. ges. Textil-Industrie 28, p. 376); and Kingzett (Chem. Encyclopedia 4th Ed., 1928, p. 471).

Naphthalene and sulphur mixed with beta-naphtol is used against clothes moths (German Patent 411,345).

Gypsum blocks are soaked in a volatile disinfectant, (for example, formaldehyde, or phenol), then in melted naphthalene, and then in paraffin for use against moths and other pests (German Patent 409,510).

Back and Cotton (Furniture Warehouseman 8, p. 800) state that naphthalene sewed into upholstered furniture is of no value in protecting it against fabric pests.

Erlenbach (U. S. Patent 1,097,406) protects furs from moths with a mixture of equal parts finely divided naphthalene and paradichlorobenzene.

Back (U.S.D.A. Farmers' Bull. 1353, p. 13) states that napthalene is very effective in the form of flakes or moth balls for protecting clothing in closets, trunks and tight chests. Back and Rabak (U.S.D.A. Bull. 1051, p. 13) state: "Although cedar chests may be regarded as protectors against clothes moths, attention is called to the fact that a chest of ordinary wood, if as tightly constructed, would be just as effective, provided the clothing were as thoroughly cleaned, brushed and sunned and from 1 to 2 pounds of good grade naphthalene were packed within."

According to German Patent 363,852 moths are destroyed by vaporizing a mixture of two-thirds naphthalene and one-third paraformaldehyde.

Naphthalene in resin soap is used to render paper and fabrics insect proof (British Patent 13,071 of 1909).

Fumigating cones are made by melting 4 kg. naphthalene with 1 kg. alpha-Tetralon (German Patent 357,063).

An apparatus for vaporizing naphthalene or naphthalene with camphor is described in German Patent 330,492.

White, Fulton and Cranor (Ent. News 40, pp. 117-121) mention naphthalene crystals as a worthwhile moth remedy.

Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 18-21) state that a number of room, closet and trunk tests were conducted, with naphthalene in the form of flakes, cakes and bricks, and that the results of the experiments showed that naphthalene kills all stages of the clothes moth very effectively.

NAPHTHALENE, CARBOXYLIC DERIVATIVES OF.

These derivatives are claimed for mothproofing in German Patent 344,266.

NAPHTHALENE, SULPHONIC DERIVATIVES OF.

Salts (sodium, potassium, lithium, and barium) of naphthalene beta-sulphonic acid, chloronaphthalene sulphonic acid, and chloronaphthalene beta-disulphonic acid are claimed by the Larvex Corporation for mothproofing (U. S. Patent 1,634,790).

NAPHTHALENE, BROMO.

1-bromonaphthalene is an oil, boiling point 281.1°.

2-bromonaphthalene, leaflets, melt at 59°.

The Graesser-Monsanta Chemical Works, ltd. (British Patent 261,241) destroys insects in fabrics by treating with a solution of 1 part monobromonaphthalene dissolved in 10 parts of benzene.

NAPHTHALENE, CHLORO.

The 1-chloro-naphthalene is a liquid, boiling point 259.3, and the 2-chloro-naphthalene is a solid, melting point 61°.

The Graesser-Monsanta Chemical Works, Ltd. (British Patent 261,241) exterminates flies by exposing them to a solution of monochloronaphthalene in a hydrocarbon oil. To destroy insects in fabrics, 1 part of monochloronaphthalene is dissolved in 10 parts of benzene and the fabric steeped in this solution. Fabrics may be treated with an emulsion of 50 parts of monochloronaphthalene with 50 parts of water and 4 parts of alcoholic ammonium oleate suitably diluted (1 part to 70-100 parts of water). The same company (British Patent 253,993) mothproofs fabrics by immersing them in an emulsion obtained by dilution of the following mixture: 25 parts monochloronaphthalene; 25 parts trichloronaphthalene; 47 parts water, and 3 parts ammonium oleate.

NAPHTHALENE, DICHLORO.

Synonym: Dichlornaphthalin.

The Graesser-Monsanta Chemical Works, Ltd. (British Patent 253,993) treats textile yarns with a mixture prepared by incorporating 10 per cent dichloronaphthalene in soap and dissolving 2 ounces of this product in one gallon of water.

NAPHTHALENE, DINITRO.

Four dinitronaphthalenes are described in Beilstein.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report dinitronaphthalene to be ineffective for mothproofing.

Dinitronaphthalene, 9 parts by weight, is used with phenol, 2 parts, to impregnate cardboard and fabrics to protect them against moths (U. S. Patent 1,216,356).

NAPHTHALENE, HEXACHLORO.

Solid, insoluble in water.

The Graesser-Monsanto Chemical Works, Ltd. (British Patent 253,993; U. S. Patent 1,725,656) impregnates textile yarns with a 5 per cent solution of hexachloronaphthalene or trichloronaphthalene, or a mixture of the

two, dissolved in benzol, for the purpose of making them undesirable as a habitation for insects.

Timber is impregnated with a mixture of 1 part of the paraffin hydrocarbon sold as burning oil 300°; 1 part paradichlorobenzene and 1 part hexachloronaphthalene or mixture of higher chlorinated naphthalenes.

NAPHTHALENE, ALPHA-KETO-CHLOROTETRAHYDRO.

Synonyms: alpha-keto-monochlorotetrahydronaphthalene, monochlorotetrahydronaphthenon (1) 1-keto-monochlorotetrahydranaphthalene, mono-1-ketotetrahydronaphthalin.

This material, according to German Patent 377,587, is suitable for use against moths and other pests.

NAPHTHALENE, ALPHA KETO-DICHLOROTETRAHYDRO.

Synonyms: Dichlortetrahydronaphtenon (1); 1-keto-dichlorotetrahydronaphthalene, dichlor-1-ketotetrahydronaphthalin.

This material, according to German Patent 377,587, is suitable for use against moths and other pests.

NAPHTHALENE MONO-SULPHONIC ACID, ALKYL DERIVATIVES OF.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moths by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of chromium, aluminum, zinc, titanium, etc. may be added, and the materials may be used in aqueous solution or in dry-cleaning solvents, such as hydrocarbons, benzene, naphtha, alcohol, and acetone. Other insect repelling substances, such as sodium fluoride or silicofluoride, may be added. The preparation may be applied during dyeing or other processes. Methyl, propyl, butyl, and amyl naphthalene sulphonic acids are given as examples.

NAPHTHALENE, NITRO-

The alpha derivative melts at 61°; the beta at 79°.

Nitronaphthalene mixed with phenol is used by Pick (U. S. Patent 1,216,356) to impregnate cardboard, which isplaced among clothing or furs to protect them against moths.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) state that alpha-nitronaphthalene is ineffective against moths.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1176) state that nitronaphthalene is ineffective as a mothproofing substance.

NAPHTHALENE POLY-SULPHONIC ACIDS, ALKYL DERIVATIVES OF.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moth by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of chromium, aluminum, zinc, titanium, etc. may be added, and the materials may be used in aqueous solution or in dry-cleaning solvents, such as hydrocarbons, benzene, naphtha, alcohol, and acetone. Other insect-repelling substances, such as sodium fluoride or silicofluoride, may be added. The preparation may be applied during dyeing

or other processes.

2-NAPHTHALENE SULPHONIC ACID.

Synonym: Naphthalene-beta-sulphonic acid.

Minaeff and Sachs (British Patent 235,914; U. S. Patent 1,634,790) claim the sodium, potassium, lithium and barium salts of the substituted and unsubstituted acid in mothproofing solution. For example, a solution may contain: sodium fluoride, .1 to 2.5 per cent; sodium silico fluoride, .1 to .6 per cent; sodium sulphate, .1 to 1 per cent; sodium benzene sulphonate, .01 to .5 per cent; sodium salt of naphthalene beta-sulphonic acid, .01 to .4 per cent, and alum, up to 5 per cent.

NAPHTHALENE, TETRACHLORO.

Synonym: Naphthalene tetrachloride.

Easily soluble in boiling alcohol, more soluble in ether. Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report naphthalene tetrachloride to be ineffective for mothproofing.

NAPHTHALENE, TRICHLORO.

Synonym: Trichlor-naphthalin.

Solid, insoluble in water.

The Graesser-Monsanto Chemical Works, Ltd. (British Patent 253,993; U. S. Patent 1,725,656) impregnates textile yarns with a 5 per cent solution of hexachloronaphthalene or trichloronaphthalene, or a mixture of the two, dissolved in benzol, for the purpose of making them undesirable as a habitation for insects.

Fabrics may be immersed in an emulsion obtained by diluting the following mixture: 25 parts monochloronaphthalene, 25 parts trichloronaphthalene, 47 parts water and 3 parts ammonium oleate. Timber which has been impregnated with zinc chloride by the known vacuum process is dried and then impregnated with a solution of trichloronaphthalene in a liquid organic solvent, for example, creosote. Trichloronaphthalene is stated to exert a specific toxic effect on the death watch beetle or on white ants.

NAPHTHALDEHYDES, HYDROXY.

Condensation products of hydroxy naphthaldehydes with p-chlorophenol or p-bromophenol or their derivatives are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

2,-7-NAPHTHALENEDIAMINE, BIS (3-4-DICHLOROPHENYL SULPHONYL).

Synonym: bis-1:2-dichlorobenzene- 4-sulpho-2′:7′-naphthylene-diamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R-SO_2-NH-R-SO_2-NR_1R_2$ in which R is an

aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. bis-1:2-Dichlorobenzene-4-sulpho-2′:7′-naphthylene-diamide is given as an example.

1,4- NAPHTHALENEDIOL.

Long needles, partly soluble in boiling water, easily soluble in boiling alcohol and ether.

Synonyms: 1,4-naphtendiol, d-hydronaphthoquinine, 1,4-hydronaphthaquinone.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report 1,4-hydronaphthaquinone to be ineffective for mothproofing.

NAPHTHALENE-2:6-DISULPHO-BIS-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}RSO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. Naphthalene-2:6-disulpho-bis-anilide is given as an example.

1,5-NAPHTHALENEDISULPHOCHLORIDE.

Synonyms: Naphthalin-disulfosaeure-(1.5) dichlorid.

Prisms, melting point 183°.

The I. G. Farbenindustrie (German Patent 449,126) uses 1,5-naphthalene-disulphochloride, dissolved in a solvent such as trichloroethylene, trichlorobenzene, or a mixture of the two for mothproofing wool.

1,5-NAPHTHALENEDISULPHOFLUORIDE.

Synonym: 1,5-Naphthalindi

1,5-naphthalenedisulphofluoride is used by the I. G. Farbenindustrie (German Patent 450,418) for mothproofing purposes.

NAPHTHALENEDISULPHONIC ACID, CHLORO.

Several isomers are possible.

Salts (sodium, potassium, lithium or barium) of this acid are claimed as ingredients of a mothproofing composition (U. S. Patent 1,634,790).

Minaeff and Sachs claim salts (Na, K, Li or Ba) of chlornaphthalene beta-di-sulphonic acid for mothproofing (British Patent 235,914).

3,6-NAPHTHALENEDISULPHONIC ACID, 1,8-DIHYDROXY.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report 1,8-dihydroxy-naphthalene-3,6-disulphonic acid to be ineffective for mothproofing.

NAPHTHALENESULPHOCHLORIDE.

Synonym: Naphthalinsulfosaeurechlorid.

Alpha-Naphthalenesulphochloride melts at 66° and beta-naphthalenesulphochloride at 76°.

The I. G. Farbenindustrie (German Patent 449,126) uses naphthalenesulphochloride, dissolved in a solvent such as trichloroethylene, trichlorobenzene, or a mixture of the two, for mothproofing wool.

NAPHTHALENESULPHONIC ACID, ISOPROPYL, SODIUM SALT OF.

Several isomers are possible.

The I. G. Farbenindustrie (British Patent 265,825) mothproofs plush upholstery by spraying it with a solution of 4 grains per liter of sodium fluosilicate and 1 grain of the sodium salt of isopropyl naphthalene sulphonic acid.

1-NAPHTHALENESULPHONIC ACID, ALUMINUM SALT.

Synonym: aluminum naphthalene-alpha-monosulphonate.

This is one of the compounds claimed by Turner (U. S. Patents 1,494,085 and 1,515,182) in a mothproofing composition.

1-NAPHTHALENESULPHONIC ACID, ZINC SALT.

Synonyms: Zinc naphthalene-alpha-monosulphonate.

Zinc naphthalene-alpha-monosulphonate is one of the ingredients of the mothproofing composition claimed by Turner (U. S. Patents 1,494,085 and 1,515,182).

2-NAPHTHALENESULPHONIC ACID, ALUMINUM SALT.

Synonym: Aluminum naphthalene beta-monosulphonate.

This is one of the compounds claimed by Turner (U. S. Patents 1,494,085 and 1,515,182) in a mothproofing composition.

2-NAPHTHALENESULPHONIC ACID, CHLORO.

Several isomers are possible.

Salts (barium, lithium, potassium and sodium) of this acid are claimed as ingredients of a mothproofing composition by Minaeff and Sachs (U. S. Patent 1,634,790; British Patent 235,914).

2-NAPHTHALENESULPHONIC ACID, ZINC SALT.

Synonyms: Zinc Naphthalene-beta-Monosulphonate.

Zinc naphthalene-beta-monosulphonate is one of the ingredients of the mothproofing composition claimed by Turner (U. S. Patents 1,494,085 and 1,515,182).

1-NAPHTHOIC ACID, 2-HYDROXY.

Synonyms: 2-oxy-alpha-Naphtoeesaeure; 2-oxy-naphthoic acid.

The I. G. Farbenindustrie (British Patent 274,425) protects material against moth attack by treating it with an orthohydroxy-

carboxylic acid, in which the para position to the hydroxyl group is occupied by halogen or sulphur. 2-Hydroxy-1-naphthoic acid is given as an example.

1-NAPHTHOIC ACID, 2-HYDROXY, SULPHURISED.

Synonyms: Sulphurized 2-oxy-naphthoic acid; acide thio-2-oxy-3-naphtoieque.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; U. S. Patent 1,734,682) mothproofs material by treating it with an ortho-hydroxy-carboxylic acid or derivative thereof in which the para-position to the hydroxyl group is occupied by halogen, sulphur or a hydrocarbon residue, and the other ortho-position to the hydroxyl group is occupied by hydroxyl, halogen, sulphur or a hydrocarbon residue. Sulphurized 2-oxy-naphthoic acid is given as an example. This compound is made by treating 2-oxy-naphthoic acid with sulphur chloride.

2-NAPTHOIC ACID, 4-CHLORO-3-HYDROXY.

Synonyms: 4-chlor-3-oxy-B-Naphthoeesaeure; 4-chlor-3-oxy-Isonaphthoeesaeure; 1-chloro-2-oxy-3-naphthoic acid.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) protects material against moth attack by treating it with an ortho-hydroxy-carboxylic acid, in which the para position to the hydroxyl group is occupied by halogen or sulphur. 1-Chloro-2-oxy-3-naphthoic acid is given as an example.

1-NAPHTHOL.

Shining monoclinic crystals, soluble in alcohol and ether, slightly soluble in water.

Synonyms: Alpha-naphthol, alpha-hydroxy-naphthalene, naphtenol, nephthol.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report alpha-naphthol to be ineffective for mothproofing.

1-NAPHTHOL, 4-CHLORO-SULPHO-4'-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl, or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 4-chloro-1-naphthol-sulpho-4'- chloroanilide is given as an example.

2-NAPHTHOL.

White scales, soluble in alcohol and ether, slightly soluble in ether. m.p. 122°.

Synonym: Beta-naphthol.

Beta-naphthol is combined with naphthalene or camphor and sulphur for fumigating clothes moths (German Patent 411,345).

2-NAPHTHOL, NITROSO.

Synonyms: 2-beta-nitrosonaphthol (1): beta-naphtochinonoxim, nitroso-beta-naphthol.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report nitroso-beta-naphthol to be ineffective for mothproofing.

NAPHTHOLPECHSULFOSAEURECHLORID.

Naphtholpechsulfosaeurechlorid is used, with or without a solvent, for mothproofing (German Patent 449,126).

NAPHTHOL YELLOW.

Naphthol yellow is: (1) naphthol yellow S (sulphur yellow S; citronine A; acid yellow S), or (2) Martius yellow (naphthylamin yellow; gold yellow; primrose; jaune d'or; Manchester yellow; naphthaline yellow, Naphthalene yellow). (1) is the calcium, ammonium, sodium or potassium salt of dinitro-alpha naphthol beta monosulphonic acid. (2) is the ammonium, sodium or calcium salt of dinitro-alpha-naphthol.

Tests in feeding clothes moth larvae with naphthol yellow (sodium salt of 2,4-dinitro-alpha-naphthol) are described by Mullin (Textile Colorist 47, p. 229).

According to Clark and Craft (J. Soc. Dyers and Colourists 41, p. 156), cloth dyed with martius yellow is completely mothproof.

Clark (Textile Mercury 79, p. 281) refers to the discovery by Meckbach of the mothproofing qualities of martius yellow (Color Index No. 9).

1,2-NAPHTHOQUINONE.

Small red needles from ether.

Synonyms: 1,2-beta-naphthoquinon, beta-naphthoquinone.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report beta-naphthoquinone to be ineffective for mothproofing.

beta-NAPHTHYL BENZOATE.

Fine needles, very soluble in hot alcohol, insoluble in water.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report beta-naphthyl benzoate to be ineffective for mothproofing.

NAPHTHYL FLUORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report naphthyl fluoride to be ineffective for mothproofing.

beta-NAPHTHYL SALICYLATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report beta-naphthyl salicylate to be ineffective for mothproofing.

1-NAPHTHYLAMINE-3,6,8-TRISULPHONIC ACID.

1-Naphthylamine-3,6,8-Trisulphonic acid is claimed for mothproofing purposes in German Patent 344,266.

For example, 100 parts by weight of wool are treated with 3 parts by weight of 1-naphthylamine-3,6,8-trisulphonic acid, 3 parts sulphuric acid, and 10 parts calcined Glauber's salt.

NAPHTHYLAMINE, ACETYL.

Acetyl naphthylamine is claimed for mothproofing wool in German Patent 346,597.

1-NAPHTHYLAMINE HYDROFLUORIDE.

Synonyms: alpha-Naphthylamine hydrofluoride, aminonaphten, hydrofluoride of aminonaphthalein, naphtalidin.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report alpha-naphthylamine hydrofluoride to be ineffective for mothproofing.

2-NAPHTHYLAMINE.

Soluble in water and alcohol.

Synonyms: amino-naphtene, beta-naphthylamine, naphtalidin.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report beta-naphthylamine to be ineffective for mothproofing.

NAPHTHYLHYDRAZINE HYDROFLUORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report naphthylhydrazine hydrofluoride and naphthylhydrazine hydrofluoride mixed with dry-cleaning soap in naphtha to be ineffective for mothproofing.

NEWSPAPER.

Sachs (Textile Colorist 48, p. 527) refers to the belief that printer's ink has peculiarly valuable properties in keeping out or destroying moths and their larvae. "Actual experiments have shown that ordinary newspaper without any printing is exactly as effective as printed newspaper and that the virtue depends upon the fact that garments free from infestation, wrapped tightly in newspaper, cannot be reached by moths or larvae, for as we have shown, larvae do not eat paper, and consequently can not reach the goods."

White, Fulton and Cranor (Ent. News 40, p. 117) state that the printers' ink of newspapers is valueless as a mothproofing agent.

NICOTINE.

Colorless liquid, soluble in water, alcohol and ether.

Synonyms: beta pyridyl-alpha-N-methylpyrrolidine.

According to Mullin (Textile Colorist 47, p. 229), tobacco extracts and nicotine solutions are worthless for use against clothes moths.

Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 25) state that every form of nicotine, at the dilutions used, failed to kill an appreciable number of larvae and that, since the greatest strength used was 1 part of tobacco extract (40 per cent nicotine, as sulphate) to 25 parts of water, it is apparent that to kill a higher percentage the preparation would have to be used very slightly diluted or undiluted. This evidently would not be practical on account of the comparative cost, and the danger of staining woolens.

NITRIC ACID.

Colorless or yellowish fuming liquid, soluble in water and alcohol.

Synonyms: azotic acid, acidum nitricum, aqua fortis, hydrogen nitrate, hydrogenii nitras.

Nitric acid is used in combination with ammonium molybdate and sodium phosphate for mothproofing wool. (Bayer and Company, British Patent 173,536; German Patent 347,720). For example, 100 parts of wool are placed in a cold bath consisting of 2 parts ammonium molybdate and 10 parts nitric acid, and while the goods are continually agitated, a dilute solution of 1 part sodium phosphate is gradually added. The goods are allowed to remain in the bath for a few hours and are then rinsed and dried.

According to Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) nitric acid, in combination with ammonium molybdate and sodium phosphate with water is ineffective as a mothproofing agent.

NUMOQUIN HYDROCHLORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report numoquin hydrochloride to be ineffective for mothproofing.

OLEIC ACID.

Yellowish oily liquid, soluble in alcohol and ether; slightly soluble in water.

Synonyms: olein acid, oleinic acid, red oil.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of oleic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840). For example: Woolen fabrics may be protected from attack by clothes moths by impregnating the fabric with a 1/2% solution of thorium oleate in white spirit.

Quinoidine is combined with oleic acid for mothproofing purposes (Jackson and Wassell U. S. Patent 1,694,219).

Ritter (British Patent 313,043) uses 7 parts of neutralized amyl naphthalene sulphonic acid and 3 parts of oleic acid in 1-1/2 per cent benzene solution for mothproofing fibrous materials.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187) report that oleic acid alone is more effective in mothproofing fabric than in combination with quinidine or other alkaloids.

OLEIC ACID, SULPHONATED.

The Larvex Corporation claims a solution containing sulphonated oleic acid for mothproofing purposes (U. S. Patent 1,634,793).

OLIVE OIL, SULPHONATED.

The Larvex Corporation claims a solution containing sulphonated olive oil for mothproofing purposes (U. S. Patent 1,634,793).

ORRIS ROOT.

The rootstock of the Florentine Iris (Iris Florentina).

Mullin (Textile Colorist 47, p. 229) states that dusting orris root over garments does not protect them against clothes moths.

OXALIC ACID.

Soluble in water, alcohol and ether.

Synonyms: acidum oxalicum, ethan-diacid.

Oxalic acid is claimed as an ingredient of mothproofing solutions in U. S. Patents 1,634,791 and 1,634,794; and British Patent 235,915.

The oxalates of alkaloids (e.g. quinine) were found by Minaeff and Wright to be absolutely useless as mothproofing agents (Ind. Eng. Chem. 21, 1187).

PAPER.

Back and Cotton (Furniture Warehouseman 8, p. 800) state "Clothes moths will not penetrate any paper. Their worms or larvae will some times eat holes in paper. *** Clothing free from moths will remain so indefinitely, provided it is securely wrapped in any good paper."

Comstock (A Manual of the Study of Insects 1917, p. 258) recommends wrapping clothing in stout paper or packing it in pasteboard boxes to protect it from clothes moths. Smith (Our Insect Friends and Enemies, 1909, p. 241) also recommends this procedure.

Ata, A. G. of Switzerland claim a process of making a mothproof paper by impregnating the paper with a preparation which protects against moths (Swiss Patent 101,949).

Woolen garments freshly cleaned and thoroughly brushed will be well protected if tightly wrapped with naphthalene in several thicknesses of ordinary paper. Many persons protect their clothing by carefully cleaning and brushing just before wrapping in paper. In wrapping with paper special attention should be given to turning back the paper at the ends of the bundle that no opportunity to gain access be left for the moths. (Back and Rabak, U.S.D.A. Bull. 1051, p. 13).

Back (U.S.D.A. Farmers' Bull. 1353, p. 13) recommends careful wrapping in unbroken paper to protect clothes against fabric pests.

PARAFORMALDEHYDE.

A mixture of 2/3 naphthalene and 1/3 paraformaldehyde is vaporized for combating moths (German Patent 363,852).

PARALDEHYDE.

Colorless liquid, soluble in 12 volumes of water.

Synonym: elaldehyde.

Jackson and Vassell (Ind. Eng. Chem. 19, p. 1177) report paraldehyde to be ineffective for mothproofing.

PATCHOULI OIL.

The essential oil of an East Indian mint, Pogostemon heyneamus.

Baumeister claims a mixture of 3 ounces of oil of patchouli to 16 ounces of alcohol as an insecticide, particularly adapted to exterminate moths (U. S. Patent 1,605,202).

PEPPER.

Black pepper is the powdered dried berries of Piper nigrum. Cayenne or red pepper is derived from species of Capsicum.

Pepper is mentioned as a well-known clothes-moth repellent in U. S. Patent 1,562,510; British Patent 173,536; and German Patent 344,266.

According to Mullin (Textile Colorist 47, p. 229), cayenne or black pepper dusted over garments is ineffective in protecting them against clothes moths.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report pepper (alcoholic extract of black pepper) to be ineffective for mothproofing.

Packard (Guide to the Study of Insects, 9th Ed., 1889, p. 347) quotes from Dr. Harris that "powdered black pepper strewed under the edge of carpets is said to repel moths."

Back (U.S.D.A. Farmers' Bull. 1353, p. 27) states that both cayenne pepper and black pepper are worthless for clothes moth control.

White, Fulton and Cranor (Ent. News 40, p. 117) state that red pepper has no value as a mothproofing agent.

Scott, Abbott and Dudley, (U.S.D.A. Bull. 707, p. 26) state that cayenne pepper has no value in preventing moth infestation.

PETROLEUM.

Sachs (American Dyestuff Reporter 14, p. 156) lists "various liquid petroleum derivatives" as moth repellents.

Petroleum is mentioned as one of the solvents suitable for use with alpha-tetralon for mothproofing purposes (German Patent 357,063).

Jackson and Wassell (Ind. Eng. Chem. 19, 1175) state that it is generally known that petroleum distillates, such as gasoline and naphtha, destroy clothes moths.

PETROLEUM ETHER.

Petroleum ether is mentioned as one of the solvents suitable for use with alpha-tetralon for mothproofing purposes (German Patent 357,063).

Petroleum ether is mentioned as a suitable solvent for the cinchona alkaloids used in mothproofing (U. S. Patent 1,615,843).

PETROLEUM NAPHTHA.

Ritter (British Patent (313,043) uses petroleum naphtha as a solvent for mothproofing materials. For example, 10 pounds of neutralized amyl naphthalene sulphonic acid are dissolved in 100 gallons of petroleum naphtha, and the material to be mothproofed is treated with this for 10 minutes.

Petroleum naphtha is mentioned as a suitable solvent for the cinchona alkaloids used in mothproofing (U. S. Patents 1,615,843; 1,694,219).

PHENACETIN, 3-NITRO.

Synonyms: 3-Nitroacetphenetidine; 3-nitroazetyl-p-phenetidin.

3-Nitroacetphenetidine is one of the compounds claimed for mothproofing purposes by Bayer and Company (German Patent 346,597). For example: 100 parts by weight of wool are treated in water with 2 parts by weight of 3-nitroazetyl-p-phenetidin, 10 parts by weight of Glauber's salt and 2 parts by weight of formic acid for 1/2 hour.

p-PHENETIDINE.

This is one of the materials claimed for mothproofing purposes in German Patent 346,597.

PHENETIDINE HYDROFLUORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report phenetidine hydrofluoride to be ineffective for mothproofing.

PHENOL.

White crystals, soluble in water, alcohol, and ether.

Synonyms: Carbolic acid, hydroxybenzene, pheneylic acid, phenic acid, phenyl hydrate.

Weinberg (U. S. Patent 1,591,902) mothproofs material with a mixture of 93 per cent water, 3 per cent phenol (carbolic acid), and 4 per cent tincture of quassia.

Ross and Ross (U. S. Patent 1,594,632) mothproof textiles with steam impregnated with about 5 per cent benzaldehyde and from 1/2 to 1 per cent phenol.

Carbolic acid is used to impregnate blocks of porous gypsum for use against clothes moths (German Patent 409,510).

Fick (U. S. Patent 1,216,356) impregnates cardboard with a mixture of dinitronaphthalene and phenol, and places this among garments to prevent the attack of insects.

A weak solution of carbolic acid is recommended for killing clothes moths by Packard (Guide to the Study of Insects, 9th Ed., 1889, p. 347).

Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 24) state that commercial crude carbolic acid, used at the rate of 1 part of the acid to 10 parts of water, proved effective in protecting flannel from moth infestation.

PHENOL, p-BROMO.

Condensation products of p-bromophenol with formaldehyde, p-chlorobenzaldehyde, o-sulphobenzaldehyde, or other aldehydes are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

PHENOL, p-CHLORO.

Condensation products of p-chloro-phenol with formaldehyde, p-chlorobenzaldehyde, o-sulphobenzaldehyde, or other aldehydes are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

PHENOL, 2-CHLORO-4-SULPHO-4' CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R-SO_2-NH-R-SO_2-NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 2-Chloro-1-phenol-4-sulpho-4'-chloroanilide is given as an example.

PHENOL, 4-CHLORO-2:6-DISULPHO-BIS-BENZYLAMIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-1-phenol-2:6-disulpho-bis-benzylamide.

PHENOL, 4-CHLORO-2:6-DISULPHO-4′- CHLORO-1′- HYDROXY-2′-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-1-phenol-2:6-disulpho-4′-chloro-1′-hydroxy-2′-anilide.

PHENOL, 4-CHLORO-2:6-DISULPHO-3′-ACETYLAMINO-1′-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-1-phenol-2:6-disulpho-3′-acetylamino-1′-anilide.

PHENOL, 4-CHLORO-2-SULPHOANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, fetahers and the like against attack by moth by treatment with 4-chloro-1-phenol-2-sulpho-anilide.

PHENOL, 4-CHLORO-2-SULPHO-4′-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-1-phenol-2-sulpho-4′-chloroanilide.

PHENOL, 4-CHLORO-2:6-DISULPHO-BIS-4′- CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-1-phenol-2:6-disulpho-bis-4′-chloroanilide. Material is impregnated with a 3 per cent solution of the sodium salt of this compound in water with the addition of acetic or sulphuric acid.

PHENOL, 4-CHLORO-2:6-DISULPHO-BIS-3′-ACETYLAMINO-1′-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4-chloro-1-phenol-2:6-disulpho-bis-3′acetylamino-1′-anilide.

PHENOL, 5-CHLORO-2:4-DISULPHO-BIS-4′CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 5-chloro-1-phenol-2:4-disulpho-bis-4′-chloroanilide.

PHENOL, 2,4-DICHLORO.

6 Condensation products of 2,4-dichlorophenol with formaldehyde, p-chlorobenzaldehyde, o-sulphobenzaldehyde, or other aldehydes are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

PHENOL, 2:6-DICHLORO-4-SULPHO-4′-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product

thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl, or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 2:6-Dichloro-1-phenol-4-sulpho-4'-chloroanilide is given as an example.

PHENOL, 4:6-DICHLORO-2-SULPHO-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 4:6-dichloro-1-phenol-2-sulphoanilide.

PHENOL, 2-METHYL-4-CHLORO.

Condensation products of 2-methyl-4-chlorophenol with formaldehyde, p-chlorobenzaldehyde, o-sulphobenzaldehyde, or other aldehydes are used to protect textiles against Anthrenus vorax, Dermestes and other pests by the I. G. Farbenindustrie (French Patent 651,646).

PHENOL para-SULPHONIC ACID.

Phenol p-sulphonic acid is claimed by Bayer and Company (French Patent 518,821) for mothproofing wool.

PHENOL ESTERS.

Phenol esters may be used in place of phenol in combination with dinitronaphthalene for impregnating cardboard to be placed among garments to prevent the attack of insects. (U. S. Patent 1,216,356).

PHENOL, PENTACHLORO.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by treating them with a solution of a higher halogenated substitution product of a carbocyclic compound, for example, pentachlorophenol. The fabric is first treated with a solution of the soda or potash salt of pentachlorophenol and is then treated with a solution of metallic salts, such as lead, zinc, calcium, barium, or aluminum, which yields a precipitate within the pores of the fabric. Perchloro (Hexachloro) phenol is likewise employed.

PHENOL, PERCHLORO.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by treating them with a solution of a higher halogenated substitution product of a carbocyclic compound, for example, perchlorophenol. The fabric is first treated with a solution of the soda or potash salt or perchlorophenol and is then treated with a solution of metallic salts, such as lead, zinc, calcium, barium, or aluminum, which will yield a precipitate within the pores of the fabric.

PHENOL RED.

Synonym: Phenol sulfonphthalein.

Minaeff (Textile Colorist 49, p. 90) has tested the changes in phenol red on passing through the alimentary tract of clothes moth larvae. Fabrics treated with phenol red were badly damaged by the larvae.

PHENOL, TETRACHLORO.

Aylesworth (U. S. Patent 1,085,783) employs this in the same way as tetrachlorocresol for mothproofing fabrics.

PHENOLPHTHALEIN.

A pale yellow powder, soluble in alcohol, ether, and alkalies, insoluble in water. In an alkaline solution this indicator is red; in an acid solution, colorless.

Synonyms: dioxphtalophenone; dioxytriphenylcarbinol carboxylic acid anhydride, Luck's indicator: "phenolax".

Wool treated with phenolphthalein shows considerable resistance to larvae attack (Minaeff, Textile Colorist 49, p. 90).

PHENOLSULPHONIC ACIDS.

Ortho, meta, and para-phenolsulphonic acids are known; also a number of phenol-disulphonic acids.

Phenolsulphonic acids are claimed for mothproofing purposes in German Patent 344,266.

PHENOLSULPHONIC ACIDS, AMINO.

Several isomeric amino-phenolsulphonic acids are known.

These derivatives are claimed for mothproofing in German Patent 344,266.

PHENYL ARSINIC ACID, SODIUM SALT.

Very poisonous; soluble in water.

Phenyl arsinic acid, sodium salt, is one of the compounds in which arsenic is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092. For example, a 2 per cent aqueous solution of the sodium salt of phenylarsinic acid is sprayed on fur and dried.

m-PHENYLENEDIAMINE, N-N'-bis (p-BROMO-PHENYLSULPHONYL).

Synonym: bis-4-bromobenzenesulpho-1':3'- phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in

organic solvents. The materials may be impregnated and dyed simultaneously. bis-4-Bromobenzenesulpho-1′:3′-phenylenediamide is given as an example.

m-PHENYLENEDIAMINE, N-N′-bis-(p-CHLOROPHENYLSULPHONYL).

Synonym: bis-4-chlorobenzene-sulpho-1′:3′-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-4-chlorobenzene-sulpho-1′:3′-phenylenediamide.

m-PHENYLENEDIAMINE, N-N′-bis (3-4-dichloro) PHENYLSULPHONYL.

Synonym: bis-1:2-dichlorobenzene-4-sulpho-1′:3′- phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulpho-1′:3′-phenylene-diamide.

Material to be mothproofed is impregnated with a 3 per cent solution of the sodium salt of this compound in aqueous solution with addition of acetic or sulphuric acid.

m-PHENYLENEDIAMINE, N-N′-bis (3-4-DICHLORO) PHENYLSULPHONYL, 4-CHLORO.

Synonym: bis-1:2-dichlorobenzene-4-sulpho-4′-chloro-1′:3′-phenylene-diamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulpho-4′-chloro-1′:3′-phenylenediamide.

m-PHENYLENEDIAMINE, N′-N^3-bis (3-4-DICHLORO-PHENYL-SULPHONYL), 6-ACETYLAMINO.

Synonym: bis-1:2-dichlorobenzene-4-sulpho-1′-acetylamino-2′-4′-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulpho-1′-acetylamino-2′-4′-phenylenediamide.

m-PHENYLENEDIAMINE, N-N′-bis (3-6-DICHLORO) PHENYLSULPHONYL.

Synonym: bis-1:4-dichlorobenzene-2-sulpho-1′:3′-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:4-dichlorobenzene-2-sulpho-1′:3′-phenylene-diamide.

m-PHENYLENEDIAMINE, N-N′-bis (4-6-dichloro) PHENYLSULPHONYL.

Synonym: bis-1:3-dichlorobenzene-4-sulpho-1′:3′-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:3-dichlorobenzene-4-sulpho-1′:3′-phenylene-diamide.

m-PHENYLENEDIAMINE, N′- (3-4-DICHLOROPHENYLSULPHONYL N^3-(3-4-6-TRICHLOROPHENYLSULPHONYL).

Synonym: 1:2:5-trichlorobenzene-4-sulpho-1′:2′-dichlorobenzene-4′-sulpho-1″:3″-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-1′:2′-dichlorobenzene-4′-sulpho-1″:3″-phenylene-diamide.

m-PHENYLENEDIAMINE, N′-(3-4-6-TRICHLOROPHENYLSULPHONYL), N^3-(3-amino-4-CHLOROPHENYLSULPHONYL).

Synonym: (1:2:5-trichlorobenzene-4-sulpho)-(4′-chloro-3′-amino-1′- sulpho)-1":3"-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with (1:2:5-trichlorobenzene-4-sulpho)-(4′-chloro-3′-amino-1′-sulpho)-1":3"-phenylenediamide.

m-PHENYLENEDIAMINE, N-N′-bis(3-4-6-TRICHLORO) PHENYLSULPHONYL.

Synonym: bis-1:2:5-trichlorobenzene-4-sulpho-1′:3′-phenylenediamide.

Material to be mothproofed is impregnated with a 3 per cent solution of bis-1:2:5-trichlorobenzene-4-sulpho-1′:3′-phenylenediamide in aqueous solution with addition of acetic or sulphuric acid (British Patent 324,962).

m-PHENYLENEDIAMINE, N-N′-BIS (3-5-dichloro-4-HYDROXY) PHENYLSULPHONYL,

Synonym: bis-2:6-dichlorophenol-4-sulpho-m-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-2:6-dichlorophenol-4-sulpho-m-phenylene-diamide.

m-PHENYLENEDIAMINE, N′-(3-4-6-TRICHLOROPHENYL-SULPHONYL)-N^3-(3-5-DICHLORO-2-HYDROXYLPHENYLSULPHONYL).

Synonym: 1:2:5-trichlorobenzene-4-sulpho-4′:6′-dichloro-1′-phenol-2′-sulpho-1":3"-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 1:2:5-trichlorobenzene-4-sulpho-4′:6′-dichloro-1′-phenol-2′-sulpho-1":3"-phenylenediamide.

o-PHENYLENEDIAMINE, N-N′-bis-(3-4-DICHLORO) PHENYLSULPHONYL.

Synonym: bis-1:2-dichlorobenzene-4-sulpho-1′:2′-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulpho-1′:2′-phenylene-diamide.

p-PHENYLENEDIAMINE, N-N′-bis (3-4-dichloro) PHENYLSULPHONYL.

Synonym: bis-1:2-dichlorobenzene-4-sulpho-1′:4′-phenylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulpho-1′:4′-phenylene-diamide.

p-PHENYLENEDIAMINE, N-N′-BIS (p-CHLOROPHENYLSULPHONYL) 2-SULPHO (p-CHLORO) ANILIDE.

Synonym: bis-4-chlorobenzenesulpho-1′:4′-phenylenediamide-2′-sulpho-4"-chloro-1"-anilide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-4-chlorobenzenesulpho-1′:4′-phenylenediamide-2′-sulpho-4"-chloro-1"-anilide.

PHENYLMETHYLHYDRAZONE BENZYLIDENE SULPHONIC ACID.

Synonym: acide benzylidene-phenylmethylhydrazone sulfonique.

Phenylmethylhydrazone benzylidene sulphonic acid is claimed for mothproofing purposes by Bayer and Company (British Patent 238,287; French Patent 581,037).

PHOSPHINE, TRI-p-TOLYL.

Tri-p-tolyl phosphine, in which phosphorus is directly linked to a carbon atom, is one of the compounds claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

PHOSPHINE DIHYDROXIDE, TRIPHENYL.

Crystallizes in prisms from aqueous alcohol or benzene - ligroin, insoluble in water, easily soluble in alcohol and benzene, insoluble in concentrated hydrochloric acid or hydriodic acid, gives up water at 100° C forming $(C_6H_5)_3P$ O whose melting point is 153.5° and boils without decomposition at 360°C.

Synonym: Triphenylphosphoniumhydroxid.

Triphenyl phosphine dihydroxide is one of the compounds in which phosphorus is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092. For example, 2 per cent of triphenylphosphinedihydroxide in a mixture of alcohol and water is sprayed on fur and dried.

PHOSPHINE GN.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report phosphine GN to be ineffective for mothproofing.

PHOSPHINE OXIDE, TRIPHENYL.

Melting point = 153.5; boiling point 360° C.

Synonym: Triphenylphosphonium oxide.

Triphenyl phosphine oxide is one of the compounds in which phosphorous is directly linked to a carbon atom that is claimed for mothproofing in British Patent 303,092.

PHOSPHINE R N.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report phosphine R N to be ineffective for mothproofing.

PHOSPHOMOLYBDIC ACID.

Yellow crystals, soluble in water, alcohol, and ether.

Synonyms: Sonnenschein's reagent; phosphor molybdansaeure.

There are several phosphomolybdic acids with different relations between the phosphorus and molybdenum content and water of crystallization, $24MoO_3 \cdot P_2O_5 \cdot (H_2O)n$.

This is one of the materials claimed by Bayer and Company (British Patent 173,536; German Patent 347,720; French Patent 518,821) for mothproofing wool: For example, 100 parts by weight of wool are treated for 1 hour with 5 parts by weight of sodium phosphate, 10 parts Glauber's salt and 3 parts sulphuric acid, then in a nitric acid bath of 10 parts ammonium molybdate (German Patent 347,720).

PHOSPHONIUM BROMIDE, ETHYLENE-DI-TRIPHENYL-.

Fabrics and the like are proofed against moths, mould, bacteria, etc., by treatment with a salt of a quaternary phosphonium base applied in a dilute aqueous or other solution. After this treatment the fabric may be treated with another salt interacting with the phosphonium salt to produce less soluble salts. Carboxylic, hydroxycarboxylic, sulphinic or sulphonic acids or inorganic acids such as sulphuric or hydrogen halide acids may be used in forming the salts from the phosphonium base.

Ethylene-di-triphenylphosphonium bromide is given as an example of a suitable compound in this class (British Patent 312,163).

PHOSPHONIUM BROMIDE, ETHYLTRIPHENYL-.

Ethyltriphenylphosphonium bromide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM BROMIDE, PENTAMETHYLENE-DI-TRIPHENYL.

Pentamethylene-di-triphenyl phosphoniumbromide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM BROMIDE, TETRAPHENYL-.

Tetraphenylphosphonium bromide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM BROMIDE, p-XYLYENE-DI-TRIPHENYL.

p-Xylylene-di-triphenylphosphonium bromide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, ALLYLTRIPHENYL-.

Allyltriphenylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, ANHYDRO-omega-CARBOXYMETHYLTRIPHENYL (INTERNAL SALT).

Anhydro-omega-carboxymethyltriphenyl phosphonium chloride (internal salt) is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, BENZYLTRIETHYL.

Benzyltriethylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics. For example, the material is sprayed with a 2 per cent solution of benzyltriethylphosphonium chloride in alcohol or other organic solvent (British Patent 312,163).

PHOSPHONIUM CHLORIDE, BENZYLTRIPHENYL.

Benzyltriphenylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, omega-CARBETHOXYMETHYLTRIPHENYL.

omega-Carbethoxymethyltriphenyl phosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, o-CHLORO-BENZYLTRIPHENYL-.

o-Chloro-benzyltriphenylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, p-CHLOROBENZYLTRIPHENYL-.

p-Chlorobenzyltriphenylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics. For example, furs are rolled in a drum for an hour with a mixture of 10 per cent p-chlorobenzyltriphenylphosphonium chloride and 90 per cent talcum (British Patent 312,163).

PHOSPHONIUM CHLORIDE, HYDROXYETHYLTRIPHENYL-.

Hydroxyethyltriphenylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM CHLORIDE, p-NITRO-BENZYLTRIPHENYL-.

p-Nitro-benzyltriphenylphosphonium chloride is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM IODIDE, ETHYLTRITOLYL-.

Ethyltritolyphosphonium is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM IODIDE, ETHYLTRIXYLYL-.

Ethyltrixylylphosphonium iodide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM IODIDE, METHYLTRIPHENYL-.

Methyltriphenylphosphonium iodide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM IODIDE, NAPHTHYLTRIETHYL.

Naphthyltriethylphosphonium iodide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM IODIDE, TETRAETHYL.

Tetraethylphosphonium iodide is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM NITRATE, BENZYLTRIPHENYL-.

Benzyltriphenylphosphonium nitrate is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHONIUM PERCHLORATE, BENZYLTRIPHENYL.

Benzyltriphenylphosphonium perchlorate is used by the I. G. Farbenindustrie for mothproofing fabrics.

For example, 100 kgs. of wool are treated with 300 liters of a .3 per cent solution in alcohol or water of benzyltriphenylphosphonium chloride. The material thus treated may be treated subsequently with a solution of potassium perchlorate whereby practically insoluble benzyltriphenylphosphonium perchlorate is produced on the fibre (British Patent 312,163).

PHOSPHONIUM SULPHATE, BENZYLTRIPHENYL

Benzyltriphenylphosphonium sulphate is used by the I. G. Farbenindustrie for mothproofing fabrics.

As an example, material treated with chlorocresotinic acid anilide sulphonic acid is after-treated with a solution of benzyltriphenylphosphonium sulphate (British Patent 312,163).

PHOSPHONIUM SULPHATE, TETRAISOBUTYL-.

Tetraisobutylphosphonium sulphate is used by the I. G. Farbenindustrie for mothproofing fabrics (British Patent 312,163).

PHOSPHOTUNGSTIC ACID.

Greenish crystals, soluble in water, alcohol, and ether.

Synonyms: phosphowolframic acid; phosphorwolframsaeure.

Phosphotungstic acid is one of the materials claimed by Bayer and Company (British Patent 173,536; German Patents 347,720 and 347,849; and French Patent 518,821) for mothproofing wool.

For example, 100 parts by weight of wool are treated for 1 hour with 3 parts sodium phosphotungstate, 10 parts Glauber's salt and 3 parts sulphuric acid (German Patent 347,720).

PHTHALIC ACID.

Synonym: benzene-ortho-dicarboxylic acid.

This acid and its butyl, isobutyl, amyl, neutral, and acid esters are claimed for mothproofing purposes in German Patent 442,901. This patent also covers the use of halogenated phthalic acid and its esters; hydroxy phthalic acid, phthalic acid amine anhydride, and the methylamine and pyridine derivatives of phthalic acid.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by treating them with a solution of a higher halogenated substitution product of a carbocyclic compound, for example, trichloro- and tetrachlorophthalic acids. The fabric is first treated with a solution of the soda or potash salt of these acids and is then treated with a solution of metallic salts, such as lead, zinc, calcium, barium, or aluminum, which will yield a precipitate within the pores of the fabric.

PHTHALIC ACID BROMIMIDE.

Synonym: Phthalsaeurebromid.

Phthalic Acid Bromimide is mentioned as being used against plant insects by Straub (German Patent 419,464) and is also suitable for mothproofing.

PHTHALIC ACID, DICHLORO, PHENYLHYDRAZIDE.

The Phenylhydrazide of dichlorophthalic acid is claimed for mothproofing purposes by Bayer abd Company (British Patent 238,287; French Patent 581,037).

PHTHALIC ACID, ETHYL ESTER.

Synonym: o-benzenedicarboxylic acid ethyl ester.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report ethyl phthalate to be ineffective for mothproofing.

PHTHALIC ACID PHENLHYDRAZIDE.

Phthalic Acid Phenylhydrazide is one of the materials claimed for mothproofing purposes by Bayer and Company (British Patent 238,287, and German Patent 402,341).

PHTHALIC ACID PHENYLMETHYL HYDRAZONE.

The I. G. Farbenindustrie (German Patent 460,545) claims Phthalic acid phenylmethyl hydrazone as a compound suitable for mothproofing purposes.

Synonym: Phthalsaeurephenylmethylhydrazon.

PINE OIL.

Drushel proposes a mixture of 1 part pine oil with from 5 to 10 times as much carbon disulphide for fumigating clothing in a tightly closed vault (U. S. Patent 1,630,836).

PINE NEEDLE OIL.

Drushel proposes a mixture of 1 part pine needle oil with from 5 to 10 times as much carbon disulphide for fumigating clothing in a tightly closed vault (U. S. Patent 1,630,836).

POTASSIUM ANTIMONATE.

White powder, insoluble in water.

Naefe dissolves antimony pentoxide in a concentrated solution of potassium hydroxide and forms a soap from this with a saponifiable fat, which is dissolved in benzine and used for mothproofing wool (German Patent 416,706).

POTASSIUM BOROTARTRATE.

Insoluble in water.

Jackson and Vassell (Ind. Eng. Chem. 19, p. 1177) report potassium borotartrate to be ineffective for mothproofing

POTASSIUM CARBONATE.

Sel de tartre (potassium carbonate) is one of the ingredients of the following mothproofing solution claimed by Seynaeve (French Patent 545,930): white soap 1,000 grams; potassium carbonate 125 grams; basic bismuth nitrate 250 grams; white arsenic 1000 grams; water 1 liter.

POTASSIUM CYANIDE.

White powder, very soluble in water.

Synonym: cyankali.

Potassium cyanide is mentioned in German Patent 258,405 as one of the well known materials used in combating clothes moths.

Erlenbach (U. S. Patent 1,097,406; British Patent 19,688 of 1912) states that paradichlorobenzene can be substituted for potassium cyanide for killing insects.

POTASSIUM FLUORIDE.

White powder, 100 cc of water at 21° C dissolve 96.3 grams potassium fluoride.

Potassium fluoride is one of the soluble fluorides included in the mothproofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790) and by Minaeff (U. S. Patent 1,634,791).

Turner (U. S. Patents 1,494,085 and 1,515,182) claims an insect-repellent animal fiber having incorporated therein the products resulting from the aqueous interaction of a salt of naphthalene sulphonic acid, zinc sulphate, and a metallic fluoride, for example, potassium fluoride.

POTASSIUM FLUOSILICATE.

White crystalline material; 100 cc of water at 17.5° dissolve 0.12 gram potassium fluosilicate.

Potassium fluosilicate is one of the soluble fluosilicates of the mothproofing composition claimed by Minaeff and Sachs (U. S. Patent 1,634,790) and by Minaeff (U. S. Patent 1,634,791).

POTASSIUM HYDROGEN FLUORIDE.

Synonym: Potassium bifluoride.

Occurs also as KF.2HF, decomposed by water, and KF.3HF, also decomposed by water.

The I. G. Farbenindustrie (British Patent 295,742; French Patent 646,479; and German Patent 468,914) mothproofs 100 kg. of material by treating it in 10 times the quantity of hot or cold water, with 2 kg. of potassium bifluoride, with or without the addition of organic or inorganic acids and salts, and subsequently rinsing in the customary manner.

Other acid fluorides, for example KF(2HF), or mixtures of simple and poly acid fluorides, as KF(HF) and KF(2HF) may be employed.

POTASSIUM HYDROGEN TARTRATE.

This is used for mothproofing purposes by the I. G. Farbenindustrie (British Patent 295,742), in combination with alizarine saphirol SE and acid ammonium fluoride.

Synonym: acid potassium tartrate.

POTASSIUM PHTHALIMIDE.

Yellowish white powder, soluble in water.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report potassium phthalimide to be ineffective for mothproofing.

POTASSIUM SILICATE.

White powder, soluble in water.

Potassium silicate is one of the substances used by Bayer and Company (British Patent 173,536) for mothproofing wool. For example, 100 parts of wool are boiled for one hour in a bath containing 5 parts potassium silicate, 20 parts Glauber's salt, and 5 parts concentrated sulphuric acid, after which the wool is rinsed and dried.

Potassium silicate, Glauber's salt and sulphric acid in water were found ineffective as mothproofing agents by Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177).

POTASH SOAP.

Norden and Company (German Patent 357,063) uses the following composition for mothproofing: 1kkg. alpha-tetralon emulsified with 1 kg. potash soap and 10 liters warm water.

Naefe (German Patent 416,706) mothproofs with a solution of potassium soap containing antimony, dissolved in benzine.

POTASSIUM FLUOSULPHONATE.

Potassium fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

PYRAZOLONE.

Pyrazolone is claimed for mothproofing woolens by Bayer and Company (U. S. Patent 1,562,510; British Patent 238,287; French Patent 581,037; and German Patent 402,341). It is dissolved in a suitable solvent, such as benzene, and the solution sprayed upon the goods.

PYRAZOLONE CHLORIDE, bis-NITROPHENYLMETHYL.

bis-Nitrophenylmethyl pyrazolone chloride is one of the compounds claimed for mothproofing purposes by Bayer and Company (British Patent 238,287; French Patent 581,037; U. S. Patent 1,562,510).

PYRETHRUM FLOWERS.

Mullin (Textile Colorist 47, p. 163; also in American Dyestuff Reporter 14, p. 323) lists powdered pyrethrum flowers as a clothes moth preventive.

In speaking of pyrethrum powder Gershenfeld (Hygeia, 1925, p. 642) says that "when fresh, this powder is at best a repellent. It will, however, destroy the larvae of moths in clothes that are thoroughly dusted with it, and then placed in a tightly constructed chest or trunk, or wrapped in unbroken paper".

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report pyrethrum extracts to be ineffective for mothproofing.

Back (U.S.D.A. Farmers' Bull. 1353, p. 17) states that pyrethrum powder, if fresh, will kill clothes moth larvae, but is considered inferior to naphthalene, paradichlorobenzene and camphor.

Scott, Abbott, and Dudley (U.S.D.A. Bull. 707, p.23) state that pyrethrum powder was found to kill 100 per cent of larvae on infested flannel, even when used in proportions as low as 4 parts of pyrethrum powder to 96 parts of flour. While no test with pyrethrum powder was made against adult clothes moths, it is safe to say that the powder would kill the adults. Clothing dusted with pyrethrum powder would be protected from larvae resulting from any eggs that might be present.

PYRETHRUM STEMS.

According to Mullin (Textile Colorist 47, p. 229), pyrethrum stems dusted over clothing are ineffective in protecting it against clothes moths.

Back (U.S.D.A. Farrers' Bull. 1353, p. 27) says that pyrethrum stems (dusted) are worthless for clothes moth control.

According to Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 26) pyrethrum stems (dusted) proved ineffective against clothes moth larvae.

PYRIDINE FLUOSULPHONATE.

Pyridine fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

PYROCATECHIN.

Colorless crystals, soluble in alcohol, partly soluble in water, soluble in ether.

Synonyms: "Brenzkatechin," catechol, ortho-dioxybenzene, oxyphenic acid, 1,2-phendiol, pyrocatechinic acid, pyrocatechol.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report pyrocatechin to be ineffective for mothproofing.

QUASSIA WOOD.

Synonym: Bitterwood.

Weinberg (U. S. Patent 1,591,902) mothproofs material with a mixture of 93 per cent water, 3 per cent carbolic acid, and 4 per cent tincture of quassia.

Back (U.S.D.A. Farmers' Bull. 1353, p. 27) states that quassia chips (dusted) are worthless for clothes moth control.

According to Mullin (Textile Colorist 47, p. 229), quassia chips when dusted over clothing are ineffective in protecting it against clothes moths.

Scott, Abbott and Dudley (U.S.D.A. Bull. 707, p. 26) state that quassia chips (dusted) proved ineffective against clothes moth larvae.

QUILLAI BARK

The bark of a rosaceous tree, Quillai saponaria.

An extract of quillai bark is an ingredient of mothproofing compositions claimed by Schmitz in U. S. Patent 1,610,167; British Patent 230,203; and German Patents 419,463 and 421,100. For example, a dry Quillai saponin powder is mixed with talcum (German Patent 419,463).

QUINICINE HYDROCHLORIDE.

An isomer of quinine hydrochloride.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinicine hydrochloride to be effective for mothproofing.

QUINICINE OLEATE.

An isomer of quinine oleate.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinicine oleate to be effective for mothproofing.

QUINIDINE.

A stereoisomer of quinine. See quinine.

Quinidine or a salt or derivative thereof is claimed for mothproofing purposes by Jackson and Wassell (British Patent 263,092; U. S. Patent 1,615,843; French Patent 625,380; Swiss Patent 125,139; and German Patent 485,573; and Ind. Eng. Chem. 19, p. 1177).

Some of the salts specified are quinidine oleate, quinidine hydrochloride, and quinidine sulphate.

Quinidine is one of the bases stated by Minaeff and Wright to have some mothproofing value, but insufficient for practical use. The-

salts (sulphate, oxalate, salicylate and sulphosalicylate) were absolutely useless as mothproofing agents. Quinidine combined with oleic acid was less effective than oleic acid alone (Ind. Eng. Chem. 21, 1187). The high cost of quinidine as compared to Eulan is pointed out in the Industrial Chemist for November, 1927 (3, p. 477).

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1178) state that quinidine as the sulphate was one of the first cinchona alkaloids studied, and it showed marked mothproofing properties.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1178) state that some pieces of wool treated with an alcoholic solution of quinidine sulphate have withstood attack in moth-stacked cupboards and are still under observation.

QUINIDINE HYDROCHLORIDE.

Soluble in 62.5 parts water at 10° C.

Synonym: Hydrochloride of conquinine.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177; U. S. Patent 1,615,843) report quinidine hydrochloride to be effective for mothproofing.

See quinine hydrochloride.

QUINIDINE HYDROFLUORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinidine hydrofluoride and also quinidine hydrofluoride mixed with drycleaning soap in naphtha to be effective for mothproofing.

See quinine hydrofluoride.

QUINIDINE SULPHATE.

Prisms, easily soluble in alcohol, somewhat soluble in ether; soluble in 108 parts water at 10° C. See quinine sulphate.

Jackson and Wassell report quinidine sulphate (U. S. Patent 1,615,843) and also quinidine sulphate mixed with dry-cleaning soap in naphtha (Ind. Eng. Chem. 19, p. 1177) to be effective for mothproofing.

QUININE.

Quinine or salts or derivatives thereof are claimed for mothproofing purposes by Loewenstein in Austrian Patent 99,430. Quinine chloride and quinine sulphate are specifically mentioned. These are applied in the form of 1 per cent solutions.

Jackson and Wassell (U. S. Patent 1,615,843) also claim quinine, its salts and other derivatives for mothproofing purposes.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187) report that while quinine is one of the alkaloids possessing some mothproofing value, this is insufficient for practical use. The salts of quinine (sulphate, oxalate, salicylate and sulphosalicylate) are absolutely useless as mothproofing agents. Quinine combined with oleic acid was less effective than oleic acid alone.

QUININE HYDROCHLORIDE.

Soluble in 39.4 parts water at 10° C.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinine hydrochloride to be effective for mothproofing.

QUININE OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinine oleate to be effective for mothproofing.

Minaeff and Wright (Ind. Eng. Chem. 21: pp. 1187-1195) state that fabrics treated with quinine in combination with oleic acid are not effectively mothproofed.

QUININE SULPHATE.

Soluble in 13 parts water.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinine sulphate to be effective for mothproofing.

Quinine sulphate is claimed by Loewenstein (Austrian Patent 99,430) for mothproofing purposes.

Minaeff and Wright (Ind. Eng. Chem. 21, pp. 1187-1195) state that quinine sulphate is absolutely useless as a mothproofing agent.

QUINOIDICINE (a mixture of quinatoxins prepared from quinoidine).

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinoidicine to be effective for mothproofing.

QUINOIDICINE OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinoidicine oleate to be effective for mothproofing.

QUINOIDINE.

Quinoidine is a mixture of alkaloids found in the mother liquors during the preparation of quinine sulphate and is obtained by precipitation with caustic soda.)

Quinoidine or salts, or derivatives thereof, are claimed for mothproofing purposes by Jackson and Wassell (U. S. Patent 1,615,843; British Patent 263,092).

Jackson and Wassell (U. S. Patent 1,694,219) prepare a mothproofing solution by combining quinoidine and a fatty acid (preferably oleic or stearic) and dissolving in a dry solvent.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1179) state that although quinoidine is the least expensive of the cinchona alkaloid products and therefore desirable from a commercial viewpoint, its commercial use as a moth repellent is limited by the fact that it is so dark that it noticeably colors materials treated with its solutions and that in this respect quinoidine does not satisfy the criteria of excellence.

QUINOIDINE HYDROCHLORIDE .

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinoidine hydrochloride to be effective for mothproofing.

QUINOIDINE OLEATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177; U. S. Patent 1,694,219) report quinoidine oleate to be effective for mothproofing.

QUINOLINE.

Synonym: 1-benzazine.

Sulphonic and carboxylic acid derivatives of quinoline are claimed for mothproofing purposes in German Patent 344,266.

QUINOLINE FLUOSULPHONATE.

Quinoline fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

QUINOLINE HYDROFLUORIDE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinoline hydrofluoride to be ineffective for mothproofing.

QUINOLINE SALICYLATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinoline salicylate to be ineffective for mothproofing.

QUINOLINE SULPHATE.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report quinoline sulphate to be ineffective for mothproofing.

8-QUINOLINOL.

Synonym: 8-Hydroxyquinoline; 1-oxyquinoline (old system).

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report 8-hydroxyquinoline to be ineffective for mothproofing.

RADIOACTIVE METALS, WATER SOLUBLE SALTS OF.

Jones (U. S. Patent 1,688,717) uses water soluble salts of radioactive metals, especially uranium, to precipitate casein in fabrics for mothproofing purposes.

RARE EARTHS.

The oxides, carbonates or hydroxides of rare earth elements are used by Kendall (British Patent 247,242; U. S. Patent 1,739,840) for rendering materials proof against attack by insects. For example, in the manufacture of paper wallboard, 1% of mixed rare earth metal carbonates is incorporated with the pulp before the wallboard is made. When finished the wallboard is sprayed with a 10% solution of raw linseed oil in white spirit.

Kendall also employs compounds having as a base radical a rare earth element and as an acid radical a higher organic acid.

RARE EARTH METALS, WATER SOLUBLE SALTS OF.

Jones (U. S. Patent 1,688,717) precipitates casein in woolens in order to mothproof them with a water soluble salt of a rare earth metal, such as cerium, thorium, or lanthanum.

RESIN ACID.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of resin acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

RICINOLEIC ACID.

Yellowish liquid, soluble in alcohol and ether - insoluble in water.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium and thallium) of ricinoleic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

RICINOLEIC ACID, SULPHONATED.

The Larvex Corporation claims a solution containing sulphonated ricinoleic acid for mothproofing purposes (U. S. Patent 1,634,793).

SAFRANINE Y.

(Not listed in Green or Schultz as such).

This is probably Safranine Y Extra, which appears to be pretty much the same as: Safranine concentrate, AG, OOF, RAE, FF, JQE, AGT, etc., a mixture of diamido-phenyl- and tolyl-tolazonium chlorides.

Minaeff (Textile Colorist 49, p. 89) found that wool dyed with safranine Y was badly damaged by clothes moth larvae and black carpet beetle larvae.

SAL SODA.

One hundred cc. water at 20° C. dissolve 92.8 grams sal soda.

Sal soda is one of the ingredients of the mothproofing solution claimed by Conlon (U. S. Patent 387,579).

SALICIN.

Jackson and Vassell (Ind. Eng. Chem. 19, p. 1177) report salicin to be ineffective for mothproofing.

SALICYLIC ACID.

100 grams water at 20° dissolve .184 gram salicylic acid.

Synonyms: 2-hydroxy benzoic acid; salicylsaure; o-oxybenzoesaure; 2-phenolmethylsaure (1); acidum salicylicum; 2-oxy-benzol-carbonsaure (1); 2-oxy-benzoesaure.

The I. G. Farbenindustrie (British Patent 299,055; French Patent 661,727) uses a cold aqueous solution of a nonhalogenated, nonsulphonated hydroxy carboxylic acid, or a substitution product thereof for mothproofing wool or fur. For example, 100 kilograms of material are treated in a washing machine in 1,000 liters of water with salicylic acid, with or without the addition of organic or inorganic acids and salts, rinsed, centrifuged and dried.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) found the salicylates of alkaloids (e.g. quinine) to be absolutely useless as mothproofing agents.

SALICYLIC ACID, 5-BROMO-3-METHYL.

Needles, melting point 231.° Insoluble in water and petroleum ether; difficultly soluble in benzol and $CHCl_3$.

Synonyms: 5-Brom-2-oxy-3-methyl-benzoesaeure, 5-Brom-2-oxy-m-toluylsaeure, and Brom-o-kresotinsaeure, 1-oxy-6-methyl-4-bromo-2-benzoic acid.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) mothproofs material by treating it with an ortho-hydroxy-carboxylic acid, or derivative thereof, in which the para position to the hydroxyl group is occupied by halogen or sulphur. 5-bromo-3-methyl salicylic acid is given as an example.

SALICYLIC ACID, 5-CHLORO.

Synonyms: 5-chlor-2-oxy-benzoesaeure, 6-chlor-salicylsaeure, 1-oxy-4-chloro-2-benzoic acid.

White needles, easily soluble in water.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) claims 5-chloro salicylic acid for mothproofing purposes.

SALICYLIC ACID, 5-CHLORO-3-METHYL.

Synonym: 1-oxy-6-methyl-4-chloro-2-benzoic acid.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) mothproofs material by treating it with an ortho-hydroxy-carboxylic acid, or derivative thereof, in which the para position to the hydroxyl group is occupied by halogen or sulphur. 5-chloro-3-methyl salicylic acid is given as an example.

SALICYLIC ACID, 5-CHLORO-3-SULPHO-2'-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e.g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. 5-chlorosalicylic acid-3-sulpho-2'-chloroanilide is given as an example.

SALICYLIC ACID, 5-CHLORO-3-SULPHO-4'-CHLOROANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with 5-chlorosalicylic acid-3-sulpho-4'-chloroanilide.

SALICYLIC ACID, 5-CHLORO-3-SULPHO-N-METHYL-ANILIDE.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers, and the like against attack by moths by treatment with 5-chlorosalicylic acid-3-sulpho-N-methyl-anilide.

SALICYLIC ACID, 5-CHLORO, SULPHURIZED.

Synonyms: Sulphurized 1-oxy-4-chloro-2-benzoic acid; acide thio 1-oxy-4-chlore-2-benzoique.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) mothproofs material by treating it with an ortho-oxy-carboxylic acid or derivative thereof in which the para-position to the hydroxyl group is occupied by halogen, sulphur or a hydrocarbon residue, and the other ortho-position to the hydroxyl group is occupied by hydroxyl, halogen, sulphur or a hydrocarbon residue. Sulphurized 1-oxy-4-chloro-2-benzoic acid is given as an example. This compound is made by treating 5-chloro salicylic acid with sulphur chloride.

SALICYLIC ACID, 3, 5-DICHLORO.

Synonyms: 3.5-Dichlor-salicylsaeure, 3.5-Dichlor-2-oxy-benzoesaeure, 1-oxy-4:6-dichloro-2-benzoic acid.

Needles, very little soluble in hot water; easily soluble in alcohol and ether.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) claims 3,5-dichloro salicylic acid for mothproofing purposes.

SALICYLIC ACID, 3,5-DIMETHYL.

Synonym: 1-oxy-4:6-dimethyl-2-benzoic acid.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; and German Patent 469,094) mothproofs material by treating it with an ortho-hydroxy-carboxylic acid, or derivative thereof, in which the para position to the hydroxyl group is occupied by halogen or sulphur. 3,5-dimethyl salicylic acid is given as an example.

SALICYLIC ACID, 3-METHYL, SULPHURIZED.

Synonym: Sulphurized 1-hydroxy-6-methyl-2-benzoic acid.

The I. G. Farbenindustrie (U. S. Patent 1,734,682) gives this as an example of a mothproofing material of the general formula $X(OH)\ (COOH)X\ C_6H_2(1, 2, 3, 5)$, in which one X represents halogen or sulphur, and the other X represents hydrogen or any substituent.

SALICYLIC ACID, 5-METHYL.

Synonym: 1-oxy-4-methyl-2-benzoic acid.

The I. G. Farbenindustrie (British Patent 274,425) mothproofs material by treating it with an ortho-hydroxy-carboxylic acid, or derivative thereof, in which the para position to the hydroxyl group is occupied

by halogen or sulphur. 5-methyl salicylic acid is given as an example.

SALICYLIC ACID, 5-METHYL, SULPHURIZED.

Synonym: Sulphurized 1-oxy-4-methyl-2-benzoic acid; acide thio 1-oxy-4-methyl-2-benzoique.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094; and U. S. Patent 1,734,682) mothproofs material by treating it with an ortho-oxy-carboxylic acid or derivative thereof in which the para-position to the hydroxyl group is occupied by halogen, sulphur or a hydrocarbon residue, and the other ortho-position to the hydroxyl group is occupied by hydroxyl, halogen, sulphur or a hydrocarbon residue. Sulphurized 1-oxy-4-methyl-2-benzoic acid is given as an example. This compound is made by treating 5-methyl salicylic acid with sulphur chloride.

SALICYLIC ACID, SULPHURIZED.

Synonym: Sulphurized 1-oxy-2-benzoic acid; acide thio 1-oxy-2-benzoique.

The I. G. Farbenindustrie (British Patent 274,425; Canadian Patent 280,549; French Patent 635,973; German Patent 469,094) mothproofs material by treating it with an ortho-oxy-carboxylic acid or derivative thereof in which the para-position to the hydroxyl group is occupied by halogen, sulphur or a hydrocarbon residue, and the other ortho-position to the hydroxyl group is occupied by hydroxyl, halogen, sulphur or a hydrocarbon residue. Sulphurized 1-oxy-2-benzoic acid is given as an example. This compound is made by treating salicylic acid with sulphur chloride.

SAPONINS.

Saponins from quillai bark enter into the composition of mothproofing solutions described by Schmitz in British Patent 230,203; German Patent 421,100; and U. S. Patent 1,610,167.

Saponin-glucosides derived from the Sapindaceae, Rosaceae, or Caryophyllaceae may be employed.

SILICIC ACID, COLLOIDAL.

Synonym: Kieselsaeure.

This is one of the acids claimed by Bayer and Company (British Patent 173,536; German Patent 347,721; French Patent 518,821) for mothproofing wool.

SOAP.

A soap containing antimony is claimed for mothproofing purposes by Naefe in German Patent 416,706.

According to Mullin (Textile Colorist 47, p. 163; also American Dyestuff Reporter 14, p. 323) soap solution is a remedy against clothes moths.

Back (U. S. D. A. Farmers' Bull. 1353, p. 27) states "Clothing washed with a strong solution of neutral laundry soap will be freed from clothes moth larvae and eggs."

The Graesser-Monsanto Chemical Works (British Patent 253,993) mothproofs textile yarns with 2 ounces per gallon of water of a mixture of 10 per cent dichloronaphthalene in soap.

Seynaeve (French Patent 545,930) protects hide and furs against insects by impregnating them with a dilute solution of: white soap, 1,000 grams; potassium carbonate, 125 grams; basic bismuth nitrate, 250 grams; white arsenic, 1,000 grams; and water, 1 liter.

Stagner (U. S. Patent 1,558,122) mothproofs hair felt with a solution of water, 10 gallons; soda ash crystals, 43 pounds; white arsenic, 10 pounds; glue, 1 pound; soap, 1/4 to 1/2 pound. The soap may be, for example, sodium oleate.

Scott, Abbott, and Dudley (U. S. D. A. Bull. 707, p. 24) state that laundry soap of the strength of 1 pound of soap to 10 gallons of water when sprayed on moth eggs on flannel killed most of the eggs; also that tests indicate that spraying or washing clothing with strong soap solution will free it from larvae and eggs of the clothes moth.

SODIUM BENZOATE.

White powder; 100 cc. of water at 25° C. dissolve 36 grams of sodium benzoate.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report sodium benzoate to be ineffective for mothproofing.

SODIUM BICARBONATE.

Synonyms: Acid carbonate of soda; hydrosodic carbonate; sesqui-carbonate of soda; sodi bicarbonas; vichy salts.

White powder; 100 cc. of water at 20° C. dissolve 9.6 grams sodium bicarbonate.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report sodium bicarbonate to be ineffective for mothproofing.

According to Mullin (Textile Colorist 47, p. 229), dusting sodium bicarbonate over garments is worthless in protecting them from clothes moths.

Back (U. S. D. A. Farmers' Bull 1353, p. 27) states that sodium bicarbonate (dusted) is worthless for clothes moth control.

According to Scott, Abbott and Dudley (U. S. D. A. Bull. 707, p. 26) sodium bicarbonate (dusted) proved ineffective against clothes moth larvae.

SODIUM BORATE.

Synonym: borax.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by soaking them in a solution of a higher halogenated substitution product of a carbocyclic compound, more particularly the chlorinated phenols, cresols, and phthalic acid. The greatest degree of noninflammability is attained by incorporating with the alkaline solution of the organic halogen acid a metallic salt which will yield a precipitate that is readily fusible or will form a good coating film on the charred fabric. Sodium borate is mentioned as a salt of this character.

Borax may be added to fluosulphonates for preserving porous organic materials (U. S. Patent 1,448,276).

SODIUM CARBONATE.

White powder; 100 cc. of water at 20° C. dissolve 21.4 grams Na_2CO_3, or 92.8 parts $Na_2CO_3 10H_2O$ (sal soda).

Synonym: Soda ash.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report sodium

carbonate to be ineffective for mothproofing.

According to Mullin (Textile Colorist 47, p. 229), dusting garments with sodium carbonate (soda ash) is ineffective in protecting them from clothes moths.

Back (U. S. D. A. Farmers' Bull. 1353, p. 27) states that sodium carbonate (dusted) is worthless for clothes moth control.

Stagner (U.S. Patent 1,558,122) employs soda ash crystals to dissolve white arsenic in water in preparing a solution to protect hair products against vermin.

Scott, Abbott, and Dudley (U. S. D. A. Bull. 707, p. 26) state that sodium carbonate (dusted) proved ineffective against the clothes moth larvae.

SODIUM CHLORIDE.

White crystalline powder; 100 cc. water at 20° C. dissolve 36 grams sodium chloride.

Synonyms: Bay salt; common salt, muriate of soda; sal commonis; sal culinaris; sal gem; salt; sodi chloridum; table salt, Kochsalz.

Sodium chloride is one of the ingredients used in a mothproofing solution by Bayer and Company (German Patent 347,849).

According to Mullin (Textile Colorist 47, p. 229), dusting garments with salt (sodium chloride) is ineffective in protecting them from clothes moths.

Back (U. S. D. A. Farmers' Bull. 1353, p. 27) states that salt (dusted) is worthless for clothes moth control.

Sodium chloride may be added to fluosulphonates for preserving porous organic materials (U. S. Patent 1,448,276).

SODIUM FLUORIDE.

White powder; 100 cc. of water at 15°C. dissolve 4 grams of sodium fluoride.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report sodium fluoride to be ineffective for mothproofing.

Sodium fluoride is an ingredient of mothproofing compositions claimed in the following patents: British Patents 235,914; 235,915; and 236,218; U. S. Patents 1,494,085; 1,515,182; 1,594,631; 1,634,790; 1,634,791; 1,634,792; and 1,682,975.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by soaking them in a solution of a higher halogenated substitution product of a carbocyclic compound, more particularly the chlorinated phenols, cresols, and phthalic acid. The greatest degree of noninflammability is attained by incorporating with the alkalin solution of the organic halogen acid a metallic salt which will yield a precipitate that is readily fusible or will form a good coating film on the charred fabric. Sodium fluoride is mentioned as a salt of this character.

Mullin (Textile Colorist 47, p. 163; also American Dyestuff Reporter, 14, p. 323) lists sodium fluoride or other fluoride as both preventive and remedial against clothes moths.

According to Back and Cotton (Furniture Warehouseman 8, p. 800), Peterman's Moth Food contains about 47 per cent sodium fluoride and about 48 per cent flour. They state that this is of no practical value in mothproofing.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moths by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of chromium, aluminum, zinc, titanium, etc. may be added and the materials may be used in aqueous solution or in dry-cleaning solvents such as hydrocarbons, benzene, naphtha, alcohol, acetone, etc. Other insect repelling substances, such as sodium fluoride or silicofluoride, may be added. The preparation may be applied during dyeing or other processes. For example, 3 parts each of methyl and propyl naphthalene sodium sulphonate, 3 parts of sodium fluoride and 3 parts of sodium sulphate, are used for mothproofing purposes in the form of a 1 per cent water solution.

Sodium fluoride may be added to fluosulphonates for preserving porous organic materials (U. S. Patent 1,448,276).

The affinity of sodium and other neutral fluorides for undyed wool has been determined by Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

A mothproofing solution comprises an aqueous solution of sodium fluoride and bile salts (Menzies, U. S. Patent 1,732,240).

Water solutions of aluminum silicofluoride and sodium fluoride when used to drench fabrics thoroughly are of value (U. S. Yearbook of Agriculture, 1927, p. 466).

White, Fulton, and Cranor (Ent. News 40, p. 137-141) state that apparently sodium fluoride is of value in mothproofing.

Sachs (Industrial Chemist 3, pp. 504-507) states that Larvex is probably a complex sodio aluminum silicofluoride, with solubility and other properties which distinguish it clearly from sodium and aluminum silicofluorides.

Scott, Abbott, and Dudley (U. S. D. A. Bull. 707, p. 26) state that sodium fluoride when used as a dust proved effective against moth larvae.

SODIUM FLUOSILICATE.

White powder; 100 cc. of water at 17.5°C. dissolve 0.65 gram of sodium fluosilicate.

Synonym: sodium silicofluoride.

Sodium fluosilicate is an ingredient of the mothproofing compositions claimed in the following patents: British Patents 235,914; 235,915; and 285,825; U. S. Patents 1,634,790; 1,634,791; 1,634,793; and 1,634,794.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moths by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of chromium, aluminum, zinc, titanium, etc. may be added, and the materials may be used in aqueous solution or in dry-cleaning solvents, such as hydrocarbons, benzene, naphtha, alcohol, and acetone. Other insect-repelling substances, such as sodium fluoride or silicofluoride, may be added. The preparation may be applied during dyeing or other processes. For example, 5 pounds of amyl naphthalene sulphonic acid, 5 pounds of sodium silico-fluoride and 4 pounds of alum are dissolved in 100 gallons of water to form a mothproofing solution.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) have determined the affinity of woolen yarn for silicofluorides, especially the sodium compound.

According to Menzies (U. S. Patent 1,732,240) an aqueous solution containing 0.5 per cent sodium fluoride and .2 per cent of a mixture of the bile salts sodium taurocholate and sodium glycocholate penetrates cloth

about 20 times faster than does plain water or a .5 per cent solution of sodium silicofluoride or sodium fluoride.

Sodium silicofluoride is mentioned by White, Fulton, and Cranor (Ent. News 40, p. 137-141) as having a decided moth-proofing effect on woolens.

Sodium fluosilicate is mentioned by Sachs (Industrial Chemist 3, p. 504-507) as a mothproofing agent.

SODIUM FLUOSULPHONATE.

Sodium fluosulphonate is used by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

SODIUM GLYCOCHOLATE.

Menzies (U. S. Patent 1,732,240) employs for mothproofing purposes an aqueous solution of a soluble fluoride and a bile salt. For example, a solution contains about 0.5 per cent sodium fluoride and about .2 per cent of sodium taurocholate and sodium glycocholate.

SODIUM HYDROGEN FLUORIDE.

Synonym: Sodium bifluoride.

Difficultly soluble in cold water.

The I. G. Farbenindustrie (German Patent 468,914; French Patent 646,479) protects wool, etc. against moths by acid fluoride salts of the formula MF(HF)n. Sodium hydrogen fluoride is given as an example.

SODIUM HYDROGEN SULPHATE.

Synonym: Sodium bisulphate.

Schmitz (British Patent 230,203) claims an insecticide consisting of an alkaloidal extract of lupins, an extract of quillai bark and sodium bisulphate.

SODIUM MOLYBDATE.

Lustrous plates, soluble in water.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by soaking them in a solution of a higher halogenated substitution product of a carbocylic compound, more particularly the chorinated phenols, cresols, and phthalic acid. The greatest degree of noninflammability is attained by incorporating with the alkaline solution of the organic halogen acid a metallic salt which will yield a precipitate that is readily fusible or will form a good coating film on the charred fabric. Sodium molybdate is mentioned as a salt of this character.

SODIUM OLEATE.

A mothproofing composition claimed by the Larvex Corporation (U. S. Patent 1,634,792; British Patent 236,218) contains approximately .1 per cent sodium oleate, .005 per cent gelatin, 1 per cent soluble fluoride, and .004 per cent organic acid, preferably citric.

SODIUM PHOSPHATE.

White crystalline material; 100 cc. of water at 20°C. dissolve 9.3 grams sodium phosphate.

Synonyms: disodium orthophosphate, disodium phosphate, hydrodisodic phosphate, sodii phosfas, tasteless purging

salts, tasteless salts.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report sodium phosphate as well as the following combinations to be ineffective for mothproofing: ammonium molybdate, nitric acid and sodium phosphate in water.

This is one of the materials used by Bayer and Company (British Patent 173,536; German Patent 347,720) in a mothproofing solution. For example, 100 parts of wool are placed in a cold bath consisting of 2 parts ammonium molybdate and 10 parts nitric acid, and while the goods are continually agitated a dilute solution of 1 part sodium phosphate is gradually added. The goods are allowed to remain for a few hours and are then rinsed and dried.

Aylesworth (U. S. Patent 1,085,783) fireproofs and mothproofs fabrics by soaking them in a solution of a higher halogenated substitution product of a carbocylic compound, more particularly the chlorinated phenols, cresols, and phthalic acid. The greatest degree of noninflammability is attained by incorporating with the alkaline solution of the organic halogen acid a metallic salt which will yield a precipitate that is readily fusible or will form a good coating film on the charred fabric. Sodium phosphate is mentioned as salt of this character.

SODIUM RESINATE.

Lawton (British Patent 13,071 of 1909) boils the following mixture into a soap for insect-proofing paper and fabrics: Powdered resin, 3 parts; soda crystals, 3 parts; naphthalene, 2 parts; and water, 100 parts. Alum may be added, also a decoction of sweet flag root.

SODIUM SILICATE.

White powder, soluble in water, insoluble in alcohol.

Synonyms: silicate of soda, sodium tetrasilicate, soluble glass, waterglass.

Aylesworth (U. S. Patent, 1,085,783) fireproofs and mothproofs fabrics by soaking them in a solution of a higher halogenated substitution product of a carbocylic compound, more particularly the chlorinated phenols, cresols, and phthalic acid. The greatest degree of noninflammability is attained by incorporating with the alkaline solution of the organic halogen acid a metallic salt which will yield a precipitate that is readily fusible or will form a good coating film on the charred fabric. Sodium silicate is mentioned as a salt of this character.

SODIUM STEARATE.

Synonym: Soap.

Kendall (British Patent 247,242) mothproofs woolens by treating with a 1.5% solution of sodium stearate, drying and passing the fabric through a warm .25% solution of cerium chloride.

SODIUM SULPHATE.

Glauber's salt is $Na_2SO_4 10H_2O$ .100 cc. of water at 20° C. dissolve 58.85 grams Glauber's salt.

Synonyms: natron vitriolate, sal Glauber, salt cake, sodii sulfas.

Sodium sulphate is mentioned as an ingredient of mothproofing solutions in the following patents: German Patents 344,266; 346,596; 346,597;

346,598; 347,720; 347,721; 347,849; and 421,100; British Patents 173,536; 230,203; 235,915; and 313,043; U. S. Patents 1,594,631; 1,610,167; 1,634,790; and 1,682,975; and French Patent 518,821. For example, 100 parts of wool are boiled for one hour in a bath consisting of 2 parts hydrofluoric acid, 10 parts Glauber's salt, and 2 parts concentrated sulphuric acid, after which the wool is rinsed and well dried. (British Patent 173,536).

Sodium sulphate may be added to fluosulphonates for preserving porous organic materials (U. S. Patent 1,448,276).

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) state that sodium sulphate is ineffective as a moth repellent.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) state that the following combinations were ineffective as mothproofing agents: Glauber's salt with hydrofluoric acid and sulfuric acid in water; Glauber's salt, potassium silicate and sulfuric acid in water; Glauber's salt with stannic acid and sulfuric acid in water; and Glauber's salt with tungstic acid and sulfuric acid in water.

SODIUM TAUROCHOLATE.

Mannies (U. S. Patent 1,732,240) employs for mothproofing purposes an aqueous solution of sodium fluoride, and a bile salt, such as sodium taurocholate.

SODIUM TUNGSTATE.

Colorless crystals, soluble in water, insoluble in alcohol.

Synonym: sodium wolframate.

Aylesworth (U. S. Patent 1,035,783) fireproofs and mothproofs fabrics by soaking them in a solution of a higher halogenated substitution product of a carbocyclic compound, more particularly the chlorinated phenols, cresols, and phthalic acid. The greatest degree of noninflammability is attained by incorporating with the alkaline solution of the organic halogen acid a metallic salt which will yield a precipitate that is readily fusible or will form a good coating film on the charred fabric. Sodium tungstate is mentioned as a salt of this character.

SPARTEIN.

A colorless thick oil.

Spartein from broom plant (Ginster) seeds is claimed for mothproofing purposes by Schmitz (German Patent 421,100).

STANNIC ACID.

Synonym: Zinnisaeure.

White powder, insoluble in water. Colloidal stannic acid is one of the complex acids claimed by Bayer and Company (British Patent 173,536; German Patent 347,721; French Patent 518,821) for mothproofing wool. For example, 100 parts of wool are heated to boiling for one hour in a solution of 3 parts of colloidal stannic acid, after which the bath is acidified with 3 parts of concentrated sulphuric acid, and 10 parts of Glauber's salt are added. The wool thus treated is allowed to cool in the bath and is then rinsed and dried.

Stannic acid, Glauber's salt and sulphuric acid in water are said by Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) to be ineffective as mothproofing agents.

STEARIC ACID.

White mass, soluble in alcohol and ether, sparingly soluble in water.

Synonyms: cetylacetic acid, n-octodecylic acid, stearinic acid, stearophanic acid.

The stearates of cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium, are claimed for mothproofing purposes by Kendall (British Patent 247,242; French Patent 603,552).

Stearic acid is one of the preferred fatty acids used by Jackson and Wassell (U. S. Patent 1,694,219) to combine with quinoidine in preparing a mothproofing solution.

STEARIC ACID, DIHYDROXY.

Synonyms: dioxystearic acid, dioxystearinic acid.

Rare earth salts (cerium, lanthanum, didymium, thorium, zirconium, uranium, titanium, and thallium) of dioxystearic acid are claimed for mothproofing by Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840).

STIBINE, DIPHENYLETHYL.

Colorless, thick oil, boiling point at 16-18 mm. 190-192° uncorr.

Fumes in Air, whence it also oxydizes.

Synonym: Aethyl diphenyl stibin.

Diphenylethyl stibine is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE, TRIBROMOPHENYL.

Tribromophenyl stibine is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE, TRI-alpha-NAPHTHYL.

Crystals from benzene and acetone, melting point 218°, sparingly soluble in most organic solutions.

Tri-alpha-naphthyl-stibine is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for moth-proofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE, TRIPHENYL.

Colorless, transparent triclinic plates, very readily soluble in ether, benzene, acetic acid, petroleum, ether, carbon disulphide and chloroform, slightly soluble in alcohol and water, melting point 48°.

Triphenyl stibine is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

For example, woolen material is immersed in a 3 per cent solution of triphenylstibine in benzine, withdrawn, centrifuged and the solvent evaporated. The triphenylstibine is ultimately converted into triphenylstibine oxide by the oxygen of the air, or oxidation may be effected by treatment with chlorine, hydrogen peroxide, or bleaching powder. The triphenylstibine may be dusted on the goods in powder form.

STIBINE, TRI-O-TOLYL.

Easily soluble in chloroform, benzene, ether, and petroleum ether, less readily soluble in alcohol.

Tri-o-tolyl stibine is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646. For example, a 3 per cent solution of tri-o-tolyl-stibine in benzine is sprayed on skin, fur, etc.

STIBINE, TRI-P-TOLYL.

Crystals, melting point 127-128; soluble in chloroform, less soluble in hot benzene.

Synonym: p-tri-tolylstibin.

Tri-p-tolyl stibine is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE ACETATE, DIPHENYL.

Diphenyl stibine acetate is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092. For example, felt may be protected with a 1 per cent solution of diphenylstibine acetate in benzene.

STIBINE DIBROMIDE, TRIMETHYL.

White crystals from ether, soluble in water.

Synonym: Trimethyl dibrom-stibine-antimony trimethyl dibromide.

Trimethyl stibine dibromide is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE DICHLORIDE, TRIETHYL.

Colorless liquid of turpentine odor that does not solidify at 12°C., insoluble in water, easily soluble in alcohol and ether. Density at 17 = 1.540.

Synonym: Triäthylstibindichlorid

Triéthyl stibine dichloride is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE DICHLORIDE, TRIMETHYL.

Hexagonal crystals, difficultly soluble in cold water.

Trimethyl stibine dichloride is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE OXIDE, DIPHENYL.

White needles, melting point 78°, soluble in alcohol.

Diphenyl stibine oxide is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092.

STIBINE OXIDE, TRIPHENYL.

Triphenyl stibine oxide is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STIBINE SULPHATE, TRIMETHYL.

Crystals, easily soluble in water, difficultly soluble in alcohol.

Synonym: Antimony trimethyl sulphate.

Trimethyl stibine sulphate is one of the compounds in which antimony is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and German Patent 485,646.

STILBENES.

Colorless crystals, soluble in benzene and ether, slightly soluble in alcohol, insoluble in water.

Synonyms: diphenylethylene, toluylene; bibenzal.

Sulphonic and carboxylic acid derivatives of the stilbenes are claimed for mothproofing purposes in German Patent 344,266.

SULPHANILIC ACIDS.

Synonyms: sulfanilsaeuren, p-amidobenzene-sulphonic acid.

These compounds as well as their alkylated and benzoylated derivatives are claimed for mothproofing purposes in German Patent 344,266.

SULPHATES, ALKALI METAL.

The alkali metal sulphates are the sulphates of sodium, potassium, lithium, caesium, and rubidium. (See sodium sulphate, etc.)

One hundred cc. of water at 20°C. dissolve 58.35 grams of sodium sulphate; 100 cc. of water at 20°C. dissolve 11.1 grams of potassium sulphate; 100 grams of a saturated solution at 20°C. contain 25.5 grams of lithium sulphate; 100 cc. of water at 20°C. dissolve 178.7 grams of caesium sulphate; 100 cc. of water at 20°C. dissolve 48.2 grams of rubidum sulphate.

Alkali metal sulphates are ingredients of mothproofing solutions claimed in British Patents 235,914 and 235,915.

SULPHOCHLORIDES.

Chlorides of nonvolatile or slightly volatile sulphonic acids with or without solvents, are claimed for mothproofing in German Patent 449,126. Sulphochlorides of condensation products of aldehydes or sulphur chloride may be used.

SULPHOFLUORIDES.

The fluorides of non-volatile or slightly volatile sulphonic acids (Sulfosaeuren) with or without a solvent are claimed for mothproofing in German Patent 450,418.

SULPHONATED FATTY ACIDS.

The I. G. Farbenindustrie (British Patent 285,825; French Patent 654,712) incorporates sulphonated fatty acids as wetting agents in a mothproofing medium.

SULPHONIC ACIDS.

Salts of sulphonic acids are mentioned as being used for mothproofing purposes in German Patent 430,186.

Aromatic sulphonic acids or their salts or derivatives are used as wetting agents in mothproofing media by the I. G. Farbenindustrie (British Patent 285,825; French Patent 654,712). For example, a solution of sodium fluosilicate (4 grains per liter) and isopropylnaphthalene sodium sulphonate is sprayed on plush upholstery of furniture.

Sulphonic acid derivatives of aromatic or heterocylic compounds and their substitution products are claimed for mothproofing purposes in German Patent 344,266.

SULPHOSALICYLIC ACID.

Several isomers are possible.

The sulphosalicylates of alkaloids (e.g. quinine) were found to be absolutely useless as mothproofing agents by Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

SULPHUR, S.

Yellow crystals soluble in carbon disulphide, insoluble in water.

Synonym: brimstone.

A mixture of sulphur with naphthalene, camphor, or beta-naphthol is melted and used in repelling moths (German Patent 411,345).

According to Mullin (Textile Colorist 47, p. 229), dusting garments with sulphur is ineffective in protecting them from clothes moths.

Back (U. S. D. A. Farmers' Bull. 1353, p. 27) states that powdered sulphur (dusted) is worthless for clothes moth control.

According to Scott, Abbott, and Dudley (U. S. D. A. Bull. 707, p. 26) sulphur sprinkled on infested flannel had no value in preventing the hatching of clothes-moth eggs.

SULPHUR CHLORIDE.

There are two sulphur chlorides: (1) Sulphur monochloride S_2Cl_2, which is insoluble in water and the boiling point of which is 138°, and (2) sulphur dichloride SCl_2, which decomposes in water and the boiling point of which is 59°. Sulphur monochloride is used to treat ortho-hydroxy-carboxylic acids to prepare mothproofing compounds, according to British Patent 274,425.

SULPHURIC ACID.

Oily liquid, soluble in water in all proportions, with the evolution of heat.

Synonyms: acidum sulphuricum, hydrogen sulphate, hydrogenii sulphas, oil of vitriol.

Sulphuric acid is one of the ingredients of mothproofing solutions mentioned in the following patents: U. S. Patents 387,579 and 1,682,975; British Patents 173,536 and 324,962; German Patents 344,266, 346,596, 346,598, 347,720, 347,721, 347,722, and 347,849; and French Patent 518,821. For example, 100 parts of wool are boiled for one hour in a bath containing 5 parts potassium silicate, 20 parts Glauber's salt, and 5 parts concentrated sulphuric acid, whereupon the wool is rinsed and dried. (British Patent 173,536).

The sulphates of alkaloids (quinine, quinidine, etc.) are absolutely useless as mothproofing agents, according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

Sulphuric acid is used with Eulan F for mothproofing wool (Meckbach, Textilberichte 2, p. 373).

Sulphuric acid in combination with Aluminum fluoride, aluminum sulphate and ammonium fluoride in water is mentioned by Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) as being ineffective as a mothproofing substance. The same authors also state that sulphuric acid, hydrofluoric acid, and Glauber's salt in water; and also the combinations of sulphuric acid, potassium silicate and Glauber's salt in water; sulphuric acid in combination with stannic acid and Glauber's salt in water; and sulphuric acid in combination with tungstic acid and Glauber's salt in water proved ineffective mothproofing agents.

TALC.

Talc is a hydrated magnesium silicate.

The I. G. Farbenindustrie (French Patent 636,434) mothproofs furs by rolling them in a drum with a dry powder consisting of talc containing 5% chlorocresotinic acid.

Schmitz (German Patent 419,463) claims a quillai-saponin solution or a dry quillai-saponin powder, alone or in admixture with another powder, for example, talcum, for mothproofing.

The I. G. Farbenindustrie (German Patent 469,256) mothproofs goods with talcum, mixed with an active material such as chlorocresotinic acid or a fluoride.

Furs are mothproofed by being rolled in a drum for 1 hour with a mixture of 10 per cent p-chlorobenzyl-triphenylphosphonium chloride and 90 per cent talcum (British Patent 312,163).

TANNIN.

Synonyms: Digallic acid, "Gallapfelgerbsaeure"; gallotannic acid, tannic acid.

Woolen fabrics are protected from moths by treating the cloth with a 3 per cent solution of tannin and then placing it in a bath of antimony salt (British Patent 160,039; German Patent 430,186).

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report tannin to be ineffective for mothproofing, also tannin in combination with the following: tannin in water, followed by tartar emetic in water; and tannin in acetone followed by antimony oleate in naphtha.

TAR.

Weinberg (U. S. Patent 1,591,902) claims a mothproofing material in the form of a continuous strip, the inner cord of which is treated with a mixture of tar and wax.

Tar is mentioned as a well-known moth repellent by Schmitz (U. S. Patent 1,610,167; British Patent 230,203) and by Smith (Our Insect Friends and Enemies, 1909, p. 242).

TARTAR EMETIC.

White powder, soluble in water; 100 cc. water at 8.7°C. dissolve 5.26 grams tartar emetic.

Synonyms: antimonii et potassii tartras, antimony potassium tartrate, emetic tartar, mordant salts, tartared antimony, tartarized antimony.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report tartar emetic to be ineffective for mothproofing wool.

Blancke (German Patent 430,186) mothproofs wool by soaking it in a solution of tannic acid and then in a solution of tartar emetic.

Naefe (U. S. Patent 1,480,289) dissolves tartar emetic in alcohol and adds it to a solution of tannin in 70 per cent alcohol in order to prepare a mothproofing solution.

TARTARIC ACID.

Colorless crystals, soluble in water, alcohol and ether.

Synonyms: dioxyethylene succinic acid; There are four modifications, the ordinary one is dextrotartaric acid.

Tartaric acid may be an ingredient of a mothproofing solution which contains a soluble fluoride, a metal sulphate, and an organic acid in a quantity of less than .1 per cent. (U. S. Patent 1,634,791; British Patent 235,915).

TETRALDON.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report tetraldon to be ineffective for mothproofing.

TETRALIN.

Synonym: tetrahydronaphthalene.

Blocks of gypsum are impregnated with tetralin for use against clothes moths (German Patent 409,510).

alpha-TETRALON.

The vapors of alpha-tetralon are used to destroy moths in clothes; for example, 1 kg. alpha-tetralon and 4 kgs. naphthalene are melted together and molded into cones. These are used as a fumigant (German Patent 357,063). 1 kg. alpha-tetralon may be emulsified with 1 kg. of potash soap in 10 liters of warm water and used as a spray.

THALLIUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the thallium salts of the higher organic acids for mothproofing. The following thallium salts are specifically mentioned; ricinoleate, resinate, stearate, oleate, linoleate, and tungate.

Water soluble salts of thallium, such as the acetate or chloride, are used by Jones (U. S. Patent 1,688,717) to precipitate casein in woolens for mothproofing purposes.

THIOCARBANILIDE.

Synonym: diphenylthiourea.

Colorless crystals, soluble in alcohol, and ether, insoluble in water.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report thiocarbonilide to be ineffective for mothproofing.

Minaeff (British Patent 301,241; U. S. Patent 1,748,579) reports thiocarbanilide to be ineffective for mothproofing cloth, although thiourea and phenylthiourea are effective.

Minaeff and Wright (Ind. Eng. Chem. 21, 1187, 1929) state that a 2 per cent solution of diphenylthiourea has little mothproofing value.

THORIUM SALTS.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report thorium oleate to be ineffective for mothproofing.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the thorium salts of the higher organic acids for mothproofing. The following thorium salts are specifically mentioned: ricinoleate, resinate, stearate, oleate, linoleate, and tungate. For example: Woolen fabrics may be protected from attack by clothes moths, by impregnating the fabric with a 1/2% solution of thorium oleate in white spirit. Roofing timbers may be protected from attack by deathwatch beetles, by painting with a 5% solution of thorium kaurolate (thorium salt of Kauri gum acid) in carbon tetrachloride. Timber piling for immersion in sea water may be protected from attack by marine animals and vegetation by impregnating or painting with the following mixture: Crude mineral oil, 21 lbs.; pale gloss oil, 36 lbs.; benzol, 30 lbs.; grinding Japan, 30 lbs.; thorium tungate, 6 lbs.; and cerium oleate, 6 lbs. Pale gloss oil is a solution of pale resin in benzine or benzol, and grinding Japan is a rapid hard drying varnish suitable for grinding colours and contains lead and manganese soaps with the addition of shellac.

Water soluble salts of thorium, such as the acetate or chloride, are used by Jones (U. S. Patent 1,688,717) to precipitate casein on woolens for mothproofing purposes.

THYMOL.

Colorless crystals, soluble in alcohol and ether, slightly soluble in water.

Synonyms: isopryopyl metacresol, 1, 4-methylmethoaethylphenol (3); methylpropyphenol, thyme camphor, thymic acid, 3-oxy-1-methyl-4-isopropylbenzol; 5-methyl-2-isopropyl-phenol; 3-hydroxy-p-cymene.

Thymol is mentioned by Schmitz (U. S. Patent 1,610,167) as a well known moth repellent.

THYMOL BLUE.

Synonym: thymol sulfonphthalein.

Minaeff (Textile Colorist 49, p. 90) has tested the changes in thymol blue on passing through the alimentary tract of clothes moth larvae. Fabrics treated with thymol blue were badly damaged by the larvae.

TIN SALTS.

Tin salts are used by Bayer and Company (German Patent 374,849) in a mothproofing solution.

The I. G. Farbenindustrie (U. S. Patent 1,744,633; British Patent 303,092) renders material mothproof by depositing in or on such materials an organic compound of tin in its quadrivalent state, one of the valences

of the tin being saturated by a radical of the group comprising alkyl, aralkyl and aryl, for example, methyl, ethyl, benzyl, phenyl, toluyl, naphthyl, bromo-phenyl, which radicals may be substituted; and the other three valences of the tin being saturated by the same or different substituents of the group comprising alkyl, aralkyl and aryl radicals, which may be substituted, and organic and inorganic acid radicals, for instance: acetyl, sulphate, carbonate and chloride, hydroxyl, oxygen and sulphur.

TIN TETRABENZYL.

Synonym: tetrabenzylzinn.

Tin tetrabenzyl is one of the compounds in which tin is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092; U. S. Patent 1,744,633; and German Patent 485,646. For example, woolen material is immersed in a 3 per cent solution of tin-tetrabenzyl in benzene. After withdrawal, it is centrifuged and the solvent evaporated at ordinary or heated temperature.

TIN TETRAPHENYL.

Synonyms: Zinn tetraphenyl, tetraphenylzinn.

Crystals, melting point 225-226°; boiling point 420°.

Easily soluble in hot benzene, pyridine, glacial acetic acid, chloroform or carbon bisulphide, soluble with difficulty in alcohol or ether, and insoluble in light petroleum.

Tin tetraphenyl is one of the compounds in which tin is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092; U. S. Patent 1,744,633; and German Patent 485,646.

TIN TRIETHYL FLUORIDE.

Tin triethyl fluoride is one of the compounds in which tin is directly linked to a carbon atom that is claimed for mothproofing wool in British Patent 303,092 and U. S. Patent 1,744,633. For example, a solution of 2 per cent tin-triethylfluoride in a mixture of benzene and alcohol is sprayed on fur and dried.

TITANIC ACID.

Synonym: Titansaeure.

Titanic acid is used for mothproofing wool by Bayer and Company. (German Patent 347,721; French Patent 518,821).

TITANIUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the titanium salts of the higher organic acids for mothproofing. The following titanium salts are specifically mentioned: ricinoleate, resinate, stearate, oleate, linoleate, and tungate. For example: Woolen rugs may be protected from attack by carpet beetles or the like, by spraying or dipping with a 5% solution of titanium abietate.

Titanium fluoride is one of the materials claimed by Bayer and Company (British Patent 173,536; German Patent 347,722; U. S. Patent 1,682,975; French Patent 518,821) for mothproofing wool. Double fluorides of titanium, for example ammonium double fluoride, are also claimed.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moth by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of *** titanium, etc. may be added, and the materials may be used

in aqueous solution or in dry-cleaning solvents, such as hydrocarbons, benzene, naphtha, alcohol, and acetone. Other insect repelling substances, such as sodium fluoride or silico-fluoride, may be added. The preparation may be applied during dyeing or other processes. For example, 3 pounds of propyl naphthalene sodium sulphonate, 2 pounds of butyl naphthalene sodium sulphonate, 5 pounds of sodium titanium fluoride, and 4 pounds of sodium sulphate, are dissolved in 100 gallons of water to form a mothproofing solution.

TOBACCO.

According to Benedict (Science 46, p. 466), burning tobacco is ineffective in killing adult moths (Tineola biselliella) placed in a small closed tumbler. So-called repellents, of which tobacco is one do not repel or harm the moth in any stage.

Packard (Guide to the Study of Insects, 9th Ed., 1889, p. 347) lists tobacco leaves as a clothes moth preventive.

Back (U. S. D. A. Farmers' Bull. 1353, p. 27) states that tobacco extracts containing nicotine and tobacco powder when used at reasonable strengths are worthless for clothes moth control.

White, Fulton, and Cranor (Ent. News 40, p. 117) declare that tobacco leaves are worthless for mothproofing.

Scott, Abbott, and Dudley (U. S. D. A. Bull. 707, p. 24-25) state that flannel dusted with powdered tobacco leaves containing 4.56 per cent nicotine remained free from moth infestation in a single cage test, untreated flannel, under the same conditions becoming infested with 12 larvae. They also state, however, that since the average tobacco powder found on the market contains a great deal less than 4 per cent of nicotine, this substance should not be depended upon for protection of clothing against moth attack.

p-TOLUENESULPHONCHLORIDE.

Synonyms: p-toluolsulfonsaure-chlorid, and p-toluolsulfochlorid.

The I. G. Farbenindustrie (German Patent 449,126) mothproofs wool by treating it with a solution of p-toluenesulphochloride, 1, 5-naphthalenedisulphochloride, or a mixture of the two in a solvent such as trichloroethylene, trichlorobenzene, or a mixture of the two.

p-TOLUENE SULPHODICHLOROAMIDE.

Synonyms: p-toluolsulfonsaeure-dichloramid; N.N-dichlor-p-toluolsulphamid.

Colorless prisms, somewhat soluble in chloroform, difficultly soluble in petroleum ether.

p-Toluene Sulphodichloroamide is mentioned as a material for use against insects attacking plants. (Straub, German Patent 410,464) which can also be used for mothproofing.

p-TOLUENESULPHOFLUORIDE.

Synonym: p-Toluolsulfofluorid.

The I. G. Farbenindustrie (German Patent 450,418) mentions p-Toluenesulphofluoride as a suitable compound for mothproofing.

p-TOLUENESULPHONIC ACID, SODIUM SALT OF.

Synonyms: p-Toluol-sulfonsaeure, 1-Methyl-benzol-sulfonsaure (4), and Toluol-sulfonsaeure-(4).

The I. G. Farbenindustrie (British Patent 295,742) mothproofs material with a solution of sodium salt of paratoluene sulphonic acid and hydrofluoric acid.

p-TOLUIC ACID, NITRO.

Synonyms: 2-nitro-p-toluic acid; acide nitro-para-toluylique; nitro-p-tolysaeure.

Bayer and Company mothproof 100 parts of wool with 1-1/2 parts nitro-p-toluic acid, 1-1/2 parts sulphuric acid, and 10 parts Glauber's salt (German Patent 344,266). According to French Patent 518,821 nitro-p-toluic acid is used for mothproofing wool.

m-TOLYLENEDIAMINE, N-N'-bis(3-6-DICHLOROPHENYLSULPHONYL).

Synonym: bis-1:4-dichlorobenzene-2-sulpho-2':4':tolylenediamide.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with an aryl-sulphonic acid amide or a derivative or substitution product thereof in which compounds the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups. All the nuclei may contain further substituents, including aryl and aralkyl residues, containing one or more sulphonic acid amino groups, e. g., a compound of the general formula $R\text{-}SO_2\text{-}NH\text{-}R\text{-}SO_2\text{-}NR_1R_2$ in which R is an aromatic nucleus and R_1 and R_2 are hydrogen, alkyl, aryl or aralkyl. The protective compounds or their alkali salts are absorbed by the material from an acid bath (with or without addition of salts, acids or wetting agents) or the free compounds may be applied in solution in organic solvents. The materials may be impregnated and dyed simultaneously. bis-1:4-Dichlorobenzene-2-sulpho-2':4'-tolylenediamide is given as an example.

m-TOLYLENEDIAMINE, BIS (3-4-DICHLOROPHENYLSULPHONYL)-6-SULPHONIC ACID.

Synonym: bis-1:2-dichlorobenzene-4-sulpho-2':4'-tolylenediamide-6-sulphonic acid.

The I. G. Farbenindustrie (British Patent 324,962) protects wool, fur, hair, feathers and the like against attack by moth by treatment with bis-1:2-dichlorobenzene-4-sulpho-2':4'-tolylene-diamide-6-sulphonic acid.

TRIAZENE, 1, 3- DIPHENYL

Synonyms: diazoaminobenzene, diazoaminobenzol, diazoamidobenzene, diazobenzeneanilide, benzeneazoanilide, benzene-diazoanilide, diazoamidobenzol.

Golden yellow scales, soluble in alcohol, ether, and benzene; insoluble in water.

Diazoaminobenzene is one of the compounds claimed for mothproofing by Bayer and Company (U. S. Patent 1,562,510; French Patent 581,037; British Patent 238,287; and German Patent 402,341).

TRICHLOROBENZENE.

Three isomers are known.

Synonym: Trichlorbenzol.

Trichlorobenzene is used as a solvent for chlorides of sulpho acids employed for mothproofing purposes, according to the process described in German Patent 449,126.

TRICHLOROETHYLENE.

Trichloroethylene is used as a solvent for chlorides of sulpho acids employed for mothproofing purposes, according to the process described in German Patent 449,126.

TRICRESOL.

A mixture of ortho-, meta-, and paracresols.

Blocks of gypsum are impregnated with tricresol and used against clothes moths (German Patent 409,510).

TRIOXYMETHYLENE.

Synonym: meta-formaldehyde.

White crystals, soluble in water, alcohol, and ether.

A mixture of 2/3 naphthalene and 1/3 trioxymethylene is vaporized for destroying moths (German Patent 363,852).

TRIPOTASSIUM DIFLUORODISULPHATE.

The I. G. Farbenindustrie (British Patent 295,742) mothproofs woolens as follows: 100 kgs. of the material in question are treated in 10 times the quantity of hot or cold water with 2 kgs. of tripotassium difluorodisulphate (ZZeitschrift fur anorganische Chemie 21,p.42), with or without the addition of organic or inorganic acids and salts, subsequently rinsed and dried in the customary manner.

TUNG OIL, OXIDIZED.

The acids or acid compounds in oxidized or blown tung oil are used by Kendall (U. S. Patent 1,739,840; British Patent 247,242) to form salts with rare earth elements for use in mothproofing compositions.

TUNGSTIC ACID.

Synonyms: orthotungstic acid, wolframic acid, wolframsaeure

Yellow powder, insoluble in water.

Tungstic acid is one of the complex acids claimed by Bayer and Company (British Patent 173,536; German Patent 347,721; French Patent 518,821) for mothproofing wool. For example: 100 parts of wool are heated to 100°C. for an hour with a solution of 3 parts of colloidal tungstic acid in 3,000 parts of water, together with 20 parts of Glauber's salt and 5 parts of sulphuric acid. After being treated the wool is rinsed and dried.

Tungstic acid in combination with Glauber's salt and sulphuric acid in water are said by Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) to be ineffective as a mothproofing agent.

TURKEY RED OIL.

Synonym: sulphonated castor oil.

The Larvex Corporation claims for mothproofing purposes a composition containing .6 per cent sodium fluosilicate, .3 per cent alum, .02 per cent gelatin, and .02 per cent Turkey red oil (U. S. Patent 1,634,793).

TURPENTINE.

Synonyms: spirits of turpentine, oil of turpentine.

Sachs (Textile Colorist 48, p. 527) mentions turpentine as a clothes moth repellent.

It is also mentioned in U. S. Patent 1,610,167 and British Patent 230,203.

Sheets of paper sprinkled with spirits of turpentine should be placed among clothes when they are laid aside for the summer. (Packard, Guide to the Study of Insects, 9th Ed., 1889, p. 347).

Formaldehyde in turpentine is employed by Berkeley and Stenhouse (British Patent 221,599) for preserving leather, etc. from insect attack.

URANIC ACID.

Synonym: Uransaeure.

Insoluble in water.

This is one of the acids claimed by Bayer and Company (British Patent 173,536; German Patent 347,721; French Patent 518,821) for mothproofing wool.

URANIUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the uranium salts of the higher organic acids for mothproofing. The following uranium salts are specifically mentioned; ricinoleate, resinate, stearate, oleate, linoleate, and tungate.

Jones (U. S. Patent 1,688,717) employs water soluble salts of uranium such as the acetate or chloride to precipitate casein upon woolens for mothproofing purposes.

UREA.

Synonym: Carbamide.

Urea (2 per cent solution), according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187), has little mothproofing value.

UREA, ALLYL.

Allylurea in 2 per cent solution has little mothproofing value according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

UREA, ALLYTHIO.

Allythiourea in 2 per cent solution has good mothproofing value according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

Minaeff (U. S. Patent 1,748,580) claims allylthiourea for mothproofing woolen goods.

UREA, PHENYL.

Phenylurea (2 per cent solution) has little mothproofing value according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

UREA, PHENYLTHIO.

Synonyms: Phenyl thioharnstoff, phenyl sulfocarbamid.

Needles; bitter taste; melting point 154°; 100 parts water at 18° dissolve .26 part compound and at 100° dissolve 5.93 parts; 100 parts alcohol at 16° C dissolve 5.59 parts compound and at the boiling point, 67.97 parts.

A 2 per cent solution of phenylthiourea in acetone or other solvent, to which .3 per cent of sulphonated castor oil may be added to facilitate wetting, is used for mothproofing fabrics (British Patent 301,421; U. S. Patents 1,748,579; and 1,748,580).

According to Minaeff and Wright (Ind. Eng. Chem. 21, 1187), phenylthiourea in 2 per cent solution has good mothproofing value.

UREA, THIO.

Synonyms: Thioharnstoff, sulfoharnstoff.

Crystals, melting point 140°; 1 part thiourea is soluble in 11 parts cold water; quite insoluble in cold strong alcohol or ether.

A 2 per cent solution of thiourea in acetone, water or other solvent, to which .3 per cent of sulphonated castor oil may be added to facilitate wetting, is used for mothproofing fabrics (British Patent 301,421; U. S. Patent 1,748,579).

According to Minaeff and Wright (Ind. Eng. Chem. 21, 1187), thiourea in 2 per cent solution has good mothproofing value.

UREA, DI-ORTHO-TOLYLTHIO.

Di-o-tolylthiourea in 2 per cent solution has doubtful mothproofing value according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

UREA, ORTHO-TOLYTHIO.

o-Tolylthiourea in 2 per cent solution has good mothproofing value according to Minaeff and Wright (Ind. Eng. Chem. 21, 1187).

Minaeff (U. S. Patent 1,748,580) claims o-tolylthiourea for mothproofing woolen goods.

VICTORIA BLUE B.

Synonym: hydrochloride of phenyl-tetramethyl-triamino-diphenyl-alpha-naphthol-carbinol.

Minaeff (Textile Colorist 49, p. 89) found that wool dyed with Victoria blue B showed considerable resistance to clothes moth larvae and black carpet beetle larvae, but by no means could be called mothproof.

VUSIN HYDROCHLORIDE.

Synonyms: iso-octyl-hydro-cunreine-dihydrochloride, vuzin bihydrochloride.

Jackson and Wassell (Ind. Eng. Chem. 19, p. 1177) report vusin hydrochloride to be ineffective for mothproofing.

WAX.

Wax is used in combination with tar for mothproofing by Weinberg (U. S. Patent 1,591,902).

WHITE SPIRIT.

A turpentine substitute, usually a petroleum product.

Kendall (British Patent 247,242) mothproofs wool with a .5% solution of thorium oleate in white spirit.

WOOD FLOUR.

Synonyms: Wood meal; farine de bois.

The I. G. Farbenindustrie (French Patent 636,434; German Patent 469,256) mothproofs furs by treating them with a dry powder consisting of wood flour treated with a mothproofing compound made according to German Patent 347,722, for example, aluminum fluoride.

YTTRIUM SALTS.

Kendall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the yttrium salts of the higher organic acids for mothproofing. The following yttrium salts are specifically mentioned: linoleate, oleate, ricinoleate, resinate, stearate, and tungate.

ZINC FLUORIDE.

White powder; slightly soluble in water; 100 cc. water at 18° C. dissolve 1.6 grams Z $nF_2.4H_2O$.

Zinc fluoride is a constituent of the mothproofing solutions claimed in U. S. Patents 1,494,085; 1,515,182; 1,634,790; 1,634,791; and 1,682,975; British Patent 173,536; German Patent 347,722; and French Patent 518,821).

ZINC FLUOSILICATE.

Synonym: Zinc silicofluoride.

White powder; 100 cc. water at 15° C. dissolve 5 grams zinc fluosilicate.

Zinc fluosilicate is one of the soluble fluosilicates claimed by Minaeff and Sachs (U. S. Patent 1,634,790) and by Minaeff (U. S. Patent 1,634,791) for mothproofing.

ZINC FLUOSULPHONATE.

Zinc fluosulphonate is sued by Landau (U. S. Patent 1,448,276) for preserving textile fabrics and other porous organic materials.

ZINC SALTS.

According to Ritter (British Patent 313,043) fibrous materials are made proof against moths by treatment with preparations containing alkyl derivatives of a naphthalene mono- or poly-sulphonate or sulphonic acid. Salts of ** zinc, *etc. may be added, and the materials may be used in aqueous solution or in dry-cleaning solvents such as hydrocarbons,

benzene, naphtha, alcohol, acetone, etc. Other insect-repelling substances such as sodium fluoride or silico-fluoride may be added. The preparation may be applied during dyeing or other processes.

Zinc salts are ingredients of mothproofing solutions used by Bayer and Company (German Patent 347,849).

The zinc salts of naphthalene alpha-mono-sulphonic acid naphthalene beta-mono-sulphonic acid are used by Turner (U. S. Patent 1,494,085) in a mothproofing solution.

ZINC SULPHATE.

Synonyms: salt of vitriol, white copperas, white vitriol, zinc sulfas, zinc sulfat.

White powder, 100 cc. water at 0° dissolve 143.3 grams $ZnSO_4.7H_2O$.

Zinc sulphate is an ingredient of mothproofing compositions claimed in the following patents: U. S. Patents 1,494,085; 1,515,182; 1,634,790; 1,634,791; and 1,682,975; German Patent 347,849; and British Patents 173,536; 235,914; and 235,015. For example, 100 parts of wool are placed over night in a bath (3,000 parts of water) containing 1 part of titanium hydrofluoric acid 2 parts of sulphate of zinc, 20 parts of Glauber's salt and 3 parts of formic acid. It is then rinsed and dried.

ZIRCONIUM SALTS.

Kandall (British Patent 247,242; French Patent 603,552; U. S. Patent 1,739,840) claims the zirconium salts of the higher organic acids for mothproofing. The following zirconium salts are specifically mentioned: ricinoleate, resinate, stearate, oleate, linoleate, and tungate.

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